TELEPHONE ENGINEER

MANAGEMENT • ENGINEERING • MAINTENANCE

APRIL 1937

Cover Illustration
"TWO MARTINIS? COMING RIGHT UP!"
Details Inside

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"TAPPING IN" ON WASHINGTON
By Roland C. Davies

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TELEPHONE TRANSMISSION THEORY AND PRACTICE
By Robt. A. Clark, Jr.

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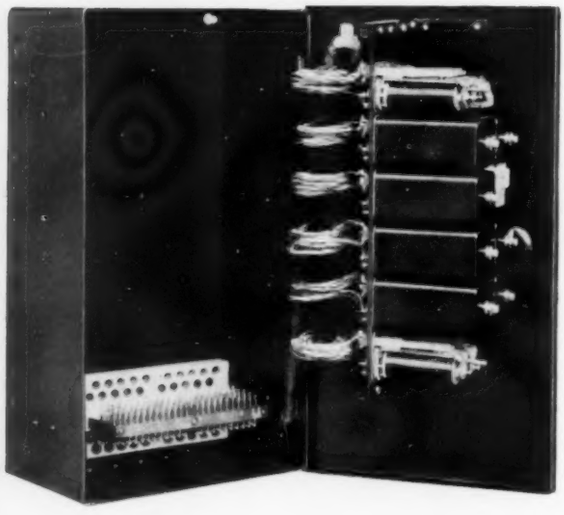
VALUE-OF-THE-SERVICE FACTOR IN UTILITY RATE PRACTICE
By George J. Eberle

The Stromberg-Carlson 2-6 Telephone Service

SAVES TIME AND EFFOR



Interior of sheet steel cabinet used with Stromberg-Carlson 2-6 Telephone System, arranged for wall mounting in basement or closet and containing all relays, fuses and terminals.

Inter-communicating service saves much time and many steps in a busine office, yet many business concerns go without this service because they fe they are too small to require a PBX switchboard.

The Stromberg-Carlson 2-6 Telephone System is the answer to the proble It is a simplified common talking, selective ringing telephone system wi 6 lines and 2 trunks and provides both local communication and centr office service from the same instrument without the services of an operat

The 8 non-locking push buttons with which each instrument is equipp permit: selective ringing of any local telephone, in addition to answerin holding, transferring or originating central office calls.

Central office calls can be originated, answered, held or transferred at a station.

One station can be arranged for secret service on both central office trunk or two stations can be arranged for secret service on one trunk each.

Economy in operation is a feature of the Stromberg-Carlson 2-6 Teleph System. It requires a central office battery of 22 volts or 18 local dry ba teries of 1½ volts each.

Write for informative Bulletin explaining in detail how the Stromber Carlson 2-6 Telephone System will assist you in selling service to the sm office.

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Stromberg-Carlson

MAKERS OF VOICE TRANSMISSION AND VOICE RECEPTION APPARATUS FOR MORE THAN FORTY YEARS

Published Monthly by Telephone Engineer Publishing Company.
A magazine devoted to the interests of the entire telephone industry —operating men and manufacturers.

TELEPHONE ENGINEER

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Founded in 1909

Office of Publication: Morton, Illinois

EDITORIAL and BUSINESS OFFICES: 185 N. WABASH, CHICAGO, ILL.
Phone Franklin 4094

VOLUME 41 APRIL, 1937 NUMBER 4

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J. A. SMITH, President and Treasurer — L. M. BERRY, Vice-President
RAY W. SMITH, Vice-President and Editor — D. WEINER, Secretary

Subscriptions: U. S., Cuba, Mexico, $1.00 Per Year; Canada, $2.00; In all Other Countries, $3.00. Single Copies, U. S. A., 15 Cents.

Entered as Second-Class Matter, at the Post Office at Morton, Illinois, Under the Act of March 3, 1879.

Static - - -

Aftermath of tag day for the collegiate to pay his long distance bill to his girl friend in Belgium reported last month leaves said lovesick swain owner of two lead slugs, one button, bone; and an offer to split an apple.

▲

Leaving in a snowstorm, and encountering in succession: sunshine, rain and sleet, and 5 minutes later an Oklahoma duststorm leaves this scribbler quaking for fear of meeting the dog-house any day now.

▲

Being called a chip from the old block reminds us that Oscar Burton and C. A. Shock down Texas way have chips of their own already chipping. A few more years and they too will be worrying about handset charges, and possibly falling hair.

▲

Amelia Earhart Putnam caught the same publicity break the FCC has been having when her round-the-world trip turtled at Honolulu; CIO stole her front page. Other publicity seekers are warned that May is already spoken for by the coronation in England. CIO is not through either!!!

▲

And readers will be wondering just what the well dressed telephone operator wears in the South Sea Islands when a new series we are angling for is broken in these columns.

▲

Which reminds us that Mr. John H. Agee and family will sail May 28th from Montreal for a business-pleasure trip to continental countries. Since succeeding to the presidency of the national association he has already developed his sea legs as his new honor has caused much traveling.

▲

Brown cord fever as a heading for telephonitis is confusing we admit, and answers the query of a Nebraska subscriber (paid). But now who is going to explain telephonitis? It is quite a familiar expression to the phony slug boys and possibly the auditing department in the red ink section of your local office. Or are we wrong?

▲

Richard Cole, new to equipment buyers, but an old friend of the writer, is now conventioning with the Automatic Electric Company exhibit. Under G. B. Foscue, Jr., we predict Dick a wonderful future and present him as a friend.

THE BRISTO
"The Newspaper That S
BRISTOL, V

49

Abingdon Woman Is Beaten by Marauder

Officers Combing Wide Area for Man Who Enters Home of Mrs. Dave Vance and Severely Beat Her; Telephone Operator Is Heroine

Police officers late last night were combing Southwestern Virginia and had carried their search into the mountains of Sullivan county, Tenn., for a white man who entered the home of Mrs. Dave Vance, on West Valley street in Abingdon, at 11 o'clock yesterday morning and attempted to attack her.

Feeling ran high in Abingdon and the surrounding section as news of the incident spread.

Mrs. Vance was alone in her home when the man, whom she later described as being short, dark complexioned, and wearing a heavy growth of beard, knocked at the rear door and asked for something to eat.

Telephone Operator Sends Help

Mrs. Vance turned to get some food for him when the man entered the kitchen and seized her. Mrs. Vance fought with the intruder all the way from the kitchen into a room in the front of the house, where she succeeded in knocking the receiver from the telephone. She was screaming for help despite blows her assailant was striking her in the face.

Mrs. Frances Cunningham, operator at the Abingdon switchboard, noted the signal from the Vance residence and answered it. She stated last night that she did not receive an answer at first, but a second later heard Mrs. Vance screaming for help.

"I recognized her voice," Mrs. Cunningham said, "and could hear her calling for help. Her voice sounded as if it were coming from a part of the house not near the telephone. I immediately called police headquarters and asked Chief of Police Patton to go to the Vance home. I also telephoned Mrs. A. A. McConnell, her next door neighbor, and told her that Mrs. Vance was calling for help."

A. A. McConnell said that he ran from his home to the Vance residence, where he could hear a commotion, followed by his wife. When they arrived they found Mrs. Vance lying unconscious on the floor. She had been severely beaten about the mouth and face, officers said.

Girl Recognizes the Attacker

Mr. McConnell told friends that he searched through the house for the intruder, looking in all save one bedroom. He said that he left the house and as he did so the front door slammed behind him. At almost the same instant, a girl employed in the McConnell home stated a man left the Vance house by a rear door and ran. She said that she recognized the man as one who had sold Christmas wreaths to several families in that neighborhood.

Chief G. K. Patton and other Abingdon officers upon arriving at the Vance home immediately launched a thorough investigation and took up the hunt for the alleged assailant of Mrs. Vance.

SINCE 1906
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TELEPHONE ENGINEER
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APRIL, 1937

"Tapping In" On Washington

C.I.O. in the Telephone Industry . . .

By ROLAND C. DAVIES
Editor
Telecommunications Reports

● The labor situation, coupled with the threat of rising prices, holds the center of the stage for the telephone industry, more than the activities of the Communications Commission or any other branch of the Federal Government at the present time. In fact, the FCC, along with practically all other departments and agencies of the Federal Government, has been marking time to a large degree during the past month because of the overshadowing importance of the "sit-down" strikes and the Supreme Court issue.

The telephone industry appears likely to be placed far down the list of the industrial "trenches", which the Committee for Industrial Organization (C.I.O.) is seeking to capture. Some observers believe that the C. I. O. may not lose any onslaught upon the telephone industry—first, because the rising tide of public opposition to the "sit-down" strikes may tend to slow down the C. I. O. movement so that it will have to be content with the unionization of the half-dozen major industries where it already is active, and second, the telephone industry is a difficult industry for the C. I. O. to swing into its fold.

● There have been some sporadic attempts to organize the telephone field, mainly in New England and the eastern states, by the C. I. O., while some organization work has been attempted at one Western Electric plant. But so far these organization moves have been reported to have been quite unsuccessful. Even C. I. O. headquarters in Washington admitted early in April that there had been no telephone conquests and that the organization work in that field would be suspended for some time. The failure of C. I. O. organizers to form local unions of telephone workers has discouraged the headquarters, it is understood, and this lack of success is exemplified by the fact that a C. I. O. local charter is issued with only a membership of 5 per cent of the workers in a city or town.

A letter to a Texas newspaper editor from a Southwestern Bell telephone worker, who said he was a former railroad brotherhood member and was friendly to organized labor, illustrated the obstacles which face C. I. O. organization. The telephone worker declared that communications employees were opposed to the C. I. O. for three major reasons—first, telephone workers got good all-year pay, vacations with pay, sick leave and retirement, and generally good working conditions and treatment by the management; second, the employees through their own organizations had always been able to arbitrate and discuss any grievances with the management and third, the telephone workers were a specialized craft, hard to replace, and had pride in their work so they did not desire any dictation of their affairs from an outside organization. These three reasons seem to epitomize the obstacles which would face John L. Lewis and his C. I. O. if a drive upon the telephone field is launched. In the industries already being C. I. O. organized, wages and working conditions are not as satisfactory as in telephony, it is also felt.

● The rising price situation with the threat of inflation is not believed by leading Government economists to be in any "grave danger zone" at the present moment but a continuation of the price spiral at a rapid rate, of course, would be highly hazardous, it is well known. The price situation, in a nutshell, may take this course during the next few months, according to a number of competent observers—prices of leading materials and commodities will flatten out at a stabilized level so both governmental and private brakes could be applied effectively to retain such a trend and as far as agricultural and food prices are concerned the Agriculture department analysts look for continued upward trends during the early summer, but a downward tendency in the late summer and fall as the crops, which appear to be normal, are harvested. For the telephone industry, the forecast of 400,000 new residences to be built in 1937 holds

hope of continued gains in stations and a continued high level of farm income indicates increasing rural telephone use. President Roosevelt and the Senate and House leaders promise no new tax legislation at this session, but there is a growing feeling that tax bill hearings may be launched at the close of the present session so a revenue measure could be prepared as a primary order of business for the session commencing in January, 1938. New taxation will strike at individual incomes with lower exemptions and higher levies on the upper incomes, it is believed certain, rather than increased burdens on corporations.

FCC Kept Busy With Broadcasting Issues . . .

● The Communications Commission activities regarding telephone regulation, have been at quite a standstill. Broadcasting, probably the most troublesome function for the FCC in its three-faceted job of regulating communications (telephone, telegraph and broadcasting), has held the spotlight. A three-week hearing on the broadcasting allocation situation in Brooklyn, has kept the entire membership of the Commission busy with all-day sessions. But, as a more important phase, the FCC is threatened to be embroiled in an investigation by Congress which has flared up both in the Senate and the House and which would delve into the broadcasting chains and their alleged monopoly over radio. If either branch of Congress does order an investigation the FCC activities in telephony would be at a minimum because all its attention would naturally have to be concentrated upon that inquiry on Capitol Hill.

The only recent major decision of interest to the telephone industry has been the proposal of the FCC Telephone Division to study its jurisdictional powers over telephone toll line construction within the boundaries of a state. The study arose when the American Telephone and Telegraph Co. and Southwestern Bell Telephone Co. presented a program for the construction of twelve circuits on existing pole line of several hundred miles length within the state of Texas. The A. T. & T., of course, accepted the FCC's jurisdiction over the two circuits which it planned to construct and received an authorization from the Division for the project, but the Southwestern Bell contended that its ten circuits would be primarily for intrastate service and should not have to be passed upon by the Federal agency.

● The FCC has called upon both the A. T. & T. and Southwestern Bell to submit statements of fact and briefs of law in support of their jurisdictional views by April 20th. From the examination of these statements and briefs the FCC will determine whether a hearing will be necessary. This method may also demonstrate a new medium of procedure for the Commission, which, if it becomes a general practice, may obviate the necessity of hearings on all issues and questions that arise before it and confine hearings only to problems of major importance. State commissions are understood to be extremely interested in the question of jurisdiction and may present their views through their National Association of Railroad and Utilities Commissioners if it is felt state regulatory powers should be protected.

The Telephone Investigation resumed its hearings after a recess of a month with a two-day session delving into the patent structure and policies of the American Telephone and Telegraph Co. and Bell System. The major theme of the hearing, as indicated in the questioning by FCC Counsel William Bauer, was that the A. T. & T. had used its patents from the early days of telephony to create a monopoly and to suppress competition. Another thought, which was believed an objective of the inquiry, was that the A. T. & T. should permit licensing of its patents to all telephone manufacturers so that the Bell System companies could be able to purchase their equipment in the open market. That latter theory, however, was only hinted at during the FCC's examination of George L. Folk, veteran patent attorney of the A. T. & T.

CONVENTION SCHEDULE

Ohio Independent Telephone Association, Deshler - Wallick Hotel, Columbus, April 21 and 22.

Kansas Telephone Association, Municipal Auditorium, Junction City, Mo., May 5 and 6.

Indiana Telephone Association, Claypool Hotel, Indianapolis, May 11 and 12.

Pennsylvania State Telephone and Traffic Association, Harris Hotel, Harrisburg, May 20, 21 and 22.

Missouri Telephone Association, Muehlbach Hotel, Kansas City, May 25 and 26.

New York State Telephone Association, Seneca Hotel, Rochester, June 2 and 3.

Washington Independent Telephone Association, Edmonds, Wash., June 25 and 26.

The Illinois Telephone Association, Hotel Pere Marquette, Peoria, September 22 and 23.

THE FRONT COVER

Interior telephone systems are being installed on many of the country's newest fast trains. Shown here is the bartender on one of the Burlington *Zephyrs*, receiving an order via a new type of magnetic handset—a telephone that operates from voice power alone and needs no batteries.

Prall Named Chairman For Third Year . . .

● President Roosevelt has reappointed Commissioner Anning S. Prall chairman of the FCC for the third consecutive year. This reappointment was considered in Washington circles as a reaffirmation by the Chief Executive of his confidence in the commission's administration by Chairman Prall.

States Report on Handset Charges to FCC . . .

● Thirty states and the District of Columbia reported to the FCC in response to a questionnaire that handset charges had been generally scaled down since the FCC commenced its Telephone Investigation. Thirteen states recorded a rate of 15 cents a month to expire at the end of 18 months, while some other states had a ten cent rate for 18 months and in some cases the expiration was fixed at the end of this year. A few states showed a rate of 25 cents for 18 months.

Important Ohio Bell Rate Case Before Supreme Court . . .

● The most important case to come before the U. S. Supreme Court at its present term—the Ohio Bell's appeal from a rate refund of $11,832,264—came up for argument April 6 at the highest tribunal. A decision by the court will probably be handed down during the latter part of May or early in June.

Appealing from the Ohio Supreme Court ruling, which upheld the state commission its rate refund order, Karl E. Burr, Ohio Bell general counsel, presented a many-sided depiction of alleged errors in the commissioner's rate refund order. One outstanding line of attack on the Ohio Commission's finding was directed at the state body's use of price trends for valuation of the Ohio Bell's property within that state during a period from 1925 to 1932 after the commission had reached a tentative valuation in 1925 which was later accepted by

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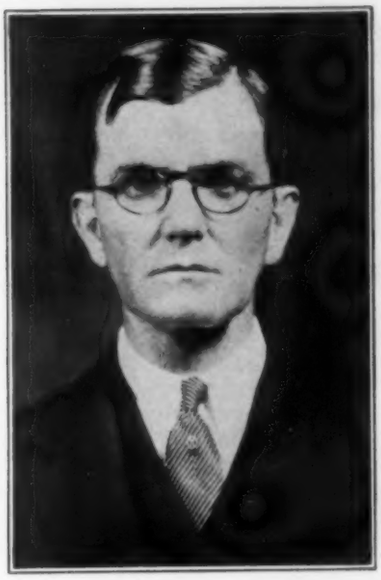
Oscar Burton to Again Lead Texas Association

By RAY W. SMITH



Oscar Burton, Tyler, Texas

● With but minor changes in its officials, the Texas Telephone Association completed its 3 day annual meeting in Dallas on March 18th. Re-elected to succeed himself, President Oscar Burton, general manager of the Gulf States Telephone Co., Tyler, stated that the meeting just adjourned was one of the best their association had ever enjoyed. More delegates from the smaller companies swelled the attendance. Speakers selected by able H. M. Stewart, secretary, made the gathering one of the busiest meetings we ever attended.

Election of R. B. (Doc) Fairly, vice-president S. W. Associated Telephone Co., Lubbock, to second vice-president succeeding W. L. Prehn, general manager of the Southwestern Bell Telephone Company, and the elevation to the directorate of Ralph Sparks, general manager of the Pecos and Northwestern Telephone Company to succeed J. C. Paxton, resigned, were the only changes among officers. H. M. Stewart, secretary, announced that many new members had associated themselves with the group during the past year.

● Optimistic over conditions, but warning of unstable economic faults, Mr. Burton, in his annual report, also called attention to the huge loss the telephone industry suffered from the January sleet storms as being one of the worst in Texas history. One could but notice the rapt attention the assemblage gave his message due to the high esteem they have in his advice and the excellent work he has done for his association as president. His statements regarding legislative matters were of prime importance. With Secretary Stewart assisting he gave a most comprehensive report of this timely subject as the state legislature was at that time considering several bills affecting the industry. An interesting coincidence was the death of three bills to create a utilities commission by the Texas lawmakers which greeted the convention on the day of adjournment.

The report of Secretary H. M. Stewart was well received and the directorate was very enthusiastic over the excellent work he had done. His discussion of all details of his office plus his wonderful program for the convention only makes his work more indispensible to the association.

Speakers before the convention were genial vice-president Sam H. Shutt, Sherman, long time stalwart of the association, who discussed an illustrated subject demonstrating the value of understanding and voice in dealing with customers. The address of Judge S. A. Lindsey of Tyler was widely quoted in daily papers and very interesting. James Thompson, a director, and general manager of the Three States Telephone Company, Corsicana, handled the subject of developing rural lines very ably.

H. M. Stewart, Secretary

● A most welcome speaker was Mr. Joe K. Wells, of the Old Age Insurance Commission, who discussed Social Security taxation and its relation to his commission. The afternoon conferences were well attended and covered four important phases of the business.

The highlight of the convention was the introduction of John H. Agee, newly elected president of the U. S. Independent Telephone Association, who traveled from his home in Lincoln, Nebraska, to address the meeting. A wonderful speaker with a sense of humor rarely encountered, Mr. Agee made a very distinct impression on Texans. His eulogy to the late F. A. MacKinnon was touching and occasioned a moment of silent respect to his memory when President Burton interrupted and called for a silent prayer.

● On the evening of the 17th the annual banquet followed by a dance was held in the Peacock Terrace. The Hon. Harry Hines of the state highway commission was principal speaker. The evening was a merry one and thoroughly enjoyed by all.

The last day started with an address by Major A. E. Wood of the Texas Planning Board who explained the purposes and reasons for its existence. Mr. J. W. Wopat, consulting engineer from Ft. Wayne, Indiana, was unavoidably detained by reconstruction work caused by the Ohio River flood and his address was not heard. His subject was very ably presented by E. B. Jennings of the Southwestern Bell who discussed "Rural Electrification and its Relation to Telephone Service," a most important subject to the industry at the present time.

The Resolutions committee reported several resolutions: on the untimely death of the late F. A. MacKinnon; ex-

tending power to the executive committee to act when REA projects threaten their service; and giving thanks to Ray W. Smith of TELEPHONE ENGINEER for continuance of his interest and the publication in the Texas Telephone Association.

● Manufacturers and suppliers with their exhibits are always well received by the association and a glance at this issue of TELEPHONE ENGINEER will see most of them well represented in our advertising columns. President Burton praised their cooperation and interest several times during the meetings.

President Oscar Burton again demonstrated his value to the association during the meeting as the daily press carried wide favorable publicity during the three days session and its value will rebound with much benefit. The editor wishes to thank all of our old friends for an enjoyable occasion and true "southern hospitality."

Newspaper Hails New Telephone Building

Occasioning a special issue of the Hamilton (Texas) Herald-Record, the new home of the Gulf States Telephone Co. Hamilton exchange was formally

(Please turn to page 29)

E. F. Carter Retires

To most of his friends, the retirement of Edwin F. Carter from active service on May 31st will come as a complete surprise, but now that he has announced his intention of turning over the affairs of the Personnel Relations Department of the American Telephone and Telegraph Company of which he was directly in charge to other hands, his business associates and his many friends throughout the industry wish him the enjoyment of many years of happiness after an eventful and successful business career.

● Starting as an Inspector for the Bell Telephone Company of Missouri in 1900, Mr. Carter rose step by step to the office which he now relinquishes. In June, 1901, he was made Solicitor of Right of Way and in October, 1901, General Foreman, which position he held until 1903 when he resigned to take the secretaryship of the Universal Adding Machine Company. He rejoined the System in 1905 as Canvassing Agent for the American Telephone and Telegraph Company with headquarters in St. Louis, and in November, 1907, he went back to the Bell Telephone Company of Missouri as Special Clerk, with which

EDWIN F. CARTER
Vice-President in charge of Personnel Relations, American Telephone and Telegraph Company, who retires from active service, May 31, 1937.

Company he remained for the next three years, being made Contract Agent in January, 1908, and Commercial Manager in 1910.

Following activities from May, 1911 until October, 1913 in other fields, Mr. Carter resumed his telephone career as Commercial Engineer of the Southwestern Telephone and Telegraph Company. In 1917, he was sent to Topeka, Kansas, as General Manager of the Kansas Division. From Topeka he went to Dallas in 1919 as General Manager for Texas, and in 1921 he returned to St. Louis as General Commercial Manager for the Southwestern System. He occupied this position until April, 1926, when he was elected Vice President of the Southwestern Bell Telephone Company, continuing to function as the head of the Commercial Department. On August 1st of the same year he was elected President of the Ohio Bell Telephone Company with headquarters in Cleveland, Ohio. In April, 1930, he was elected Vice President of the American Telephone and Telegraph Company.

● He has also served as Director of the Bell Telephone Laboratories, and as Chairman of the Finance Committee of the Stony World Sanatorium, Lake Kushaqua, N. Y.

Mr. Carter was born on May 24, 1877, in Farmington, Missouri and attended Washington University in St. Louis, Missouri. He was married in St. Louis on May 12, 1906 to Miss Mary Ida Bull. There are two children, a son, Jesse McIlvaine Carter and a daughter, Mary Clem Carter, a student at Sweet Briar College in Virginia.

Oklahoma Holds Annual Convention

● Convening March 22 and 23, the annual convention of the Oklahoma Telephone Association entertained their early arrials with a golf tournament, dutch lunch and smoker on the 21st, day before the convention. This entertainment plus the pleasure of a well planned meeting swelled the attendance to a high mark.

H. W. Hubenthal

Association secretary, H. W. (Hube) Hubenthal, dry witted but unusually able, always presents a diversified list of addresses to the membership, and this year was no exception. President C. E. Devin, manager, Apache (Okla.) Telephone Co. presided at all sessions and rewarded those attending by running a well scheduled meeting with no delays.

C. C. Deering, secretary of the U. S. Independent Telephone Association, made an address on national conditions and was kept very busy afterwards greeting old friends and making many new ones. The association is to be congratulated on having Mr. Deering assist in their well rounded program. Mr. Ralph W. Linney of the Southwestern Bell presented an REA demonstration that will prove of much value to all members.

Moving almost *en masse*, manufacturers and suppliers brought their exhibits from the Dallas meeting and assisted materially in making the 1937 convention one of the best ever held.

Telephone Transmission

Theory and Practice

By ROBERT A. CLARK, JR.

CHAPTER XV

The theory of carrier current telephony continues in this chapter. Systems in common use are described

● We learned in the preceding chapter that high frequency alternating current could be used to "carry" or convey signals of lower frequencies. These may be either telegraph signals or voice telephone. As we briefly discussed in the preceding chapter the carrier frquency is **modulated** which, in effect causes it to vary in amplitude in accordance with the modulating or control frequency. At the receiving end this modulated carrier energy passes into a circuit which converts the carriar signals back to the low frequency; this is known as **demodulation.**

We find a very interesting phenomenon taking place when the carrier frequency is modulated. Referring to Fig. 75 assume we have a carrier frequency of 20,000 cycles which we will modulate with a frequency of 1,000 cycles. The 1,000 cycle modulating frequency is shown by curve A. The carrier frequency is shown by curve B. When we modulate curve B by curve A we vary the amplitude so that the envelope is of the same curvature as the modulating frequency. This results in curve C.

● Now we can show by means of a mathematical derivation that curve C is the sum of three curves each of which is also a sine wave. These curves are: (1) the original carrier frequency (curve B), another high frequency wave one-half the amplitude of the carrier wave and 1,000 cycles less in frequency (curve D), and a third frequency one-half the amplitude of the carrier frequency and 1,000 cycles greater in frequency (curve E). If you will take the sum of the three curves B, D, and E and add them up you will obtain curve C. In other words, we find that when a carrier wave is modulated, new frequencies appear as components which differ in frequency from the carrier by the frequency of the modulating wave. The frequency component which is lower than the carrier is known as the **lower side band** (curve D). The fre-

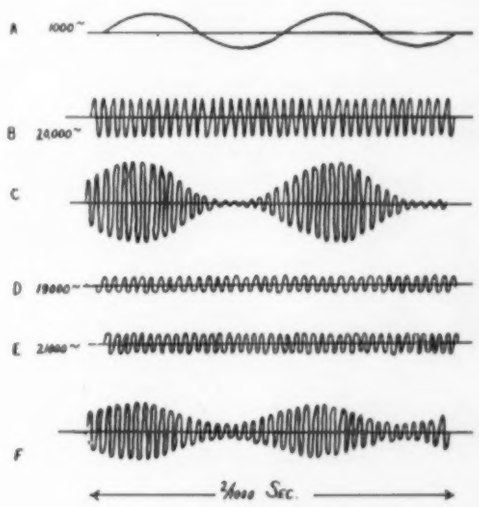
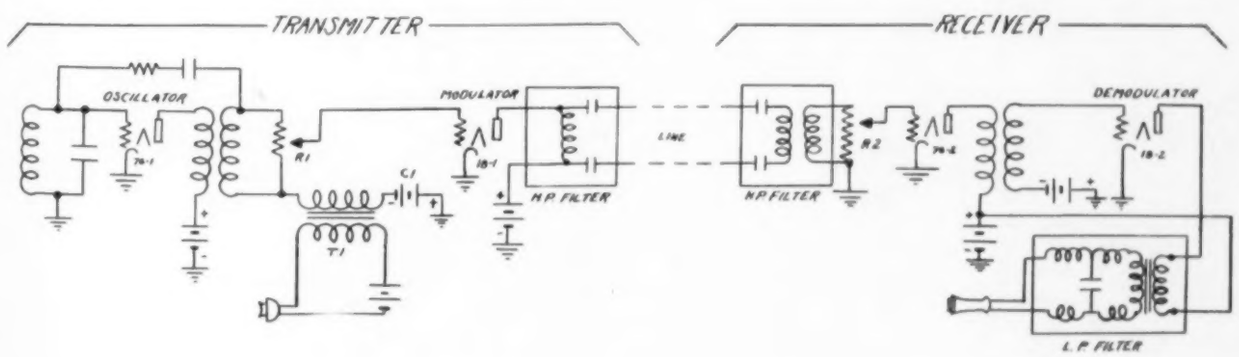


Fig. 75. Curves of a modulated carrier wave showing side band frequencies.

Fig. 76 (below). Carrier and single side band type telephone system.



quency above the carrier is known as the **upper side band** (curve E). We find by experiment and also mathematical analysis that in order to successfully transmit the modulating frequencies, the transmission system must transmit at least one of the side bands. There is no difference in quality of a system transmitting one side band as compared with the system transmitting both side bands; however, if only one side band is transmitted the amplitude of the modulating frequency must be twice as great as would be required if both side bands were transmitted. For example, curve C is the resultant of both side bands with the modulating frequency sufficient to double the amplitude of the carrier on the peaks and reduce it to zero in the valley. This is known as **100% modulation.** If the modulating wave were only one-half the amplitude of that shown, the carrier frequency would be modulated only 50% and we would obtain curve F. Likewise, if we had a modulating frequency as shown in curve A and only transmitted one side band (either the upper or the lower) the modulated wave would be as shown in curve F.

● Inasmuch as we desire to transmit as many circuits as possible over a telephone line the obvious thing to do would be to transmit only one side band thus giving twice as many available channels as would be possible if both side bands were transmitted. We find that the necessary side bands for reasonably good telephone transmission must be at least 2,000 cycles in width. In other words, for a 20,000 cycle carrier the lower side band if used must extend from 18,000 cycles to 20,000 cycles. For telegraph transmission we find it desirable to transmit a band width sufficient to carry the third harmonic of the highest signal frequency. You will recall in Chapter II that hand sending telegraph signals ranged up to about 15 cycles and printing telegraph signals up to 60 cycles; actually, however, there are few printing telegraph systems in operation at frequencies above 30 cycles. If, therefore, we transmit a band width of 100 to 150 cycles on carrier telegraph circuits, good operation will be obtained.

There are two common types of carrier telephone systems in operation today, one known as the **carrier and single side band type,** the other known as the **suppressed carrier type.** The first mentioned transmits over the telephone wires both the carrier frequency and one side band (curve B and D for example). The suppressed carrier type transmits only one side band over the line wires and carrier being supplied at the receiving end in such a manner that the modulating frequency reappears.

● Both of the above mentioned systems have certain advantages and disadvantages and the choice between the two must be a compromise depending on the conditions. The carrier and side band type can be maintained so as to provide a constant equivalent voice circuit without a complicated system of regulation. The suppressed carrier type requires either an involved scheme of automatic control or frequent testing in order to maintain voice frequency equivalent during weather changes. The carrier and side band type transmits somewhat more energy over the line then the suppressed carrier type therefore the vacuum tubes must be more powerful and the corresponding tube power load will be higher. However, the wattage requirements of either system are nominal being in the neighborhood of 60 to 150 watts per carrier channel.

The theory of the carrier and the single side band type telephone system is illustrated in Fig. 76, which shows only one transmitter connected to a line at the other end of which is a receiver; this however is sufficient to illustrate the principal of operation. Referring to the figure, at the left we have an oscillating circuit similar to that shown in the carrier telegraph circuit (Fig. 74) and described in Chapter XIV. The output of

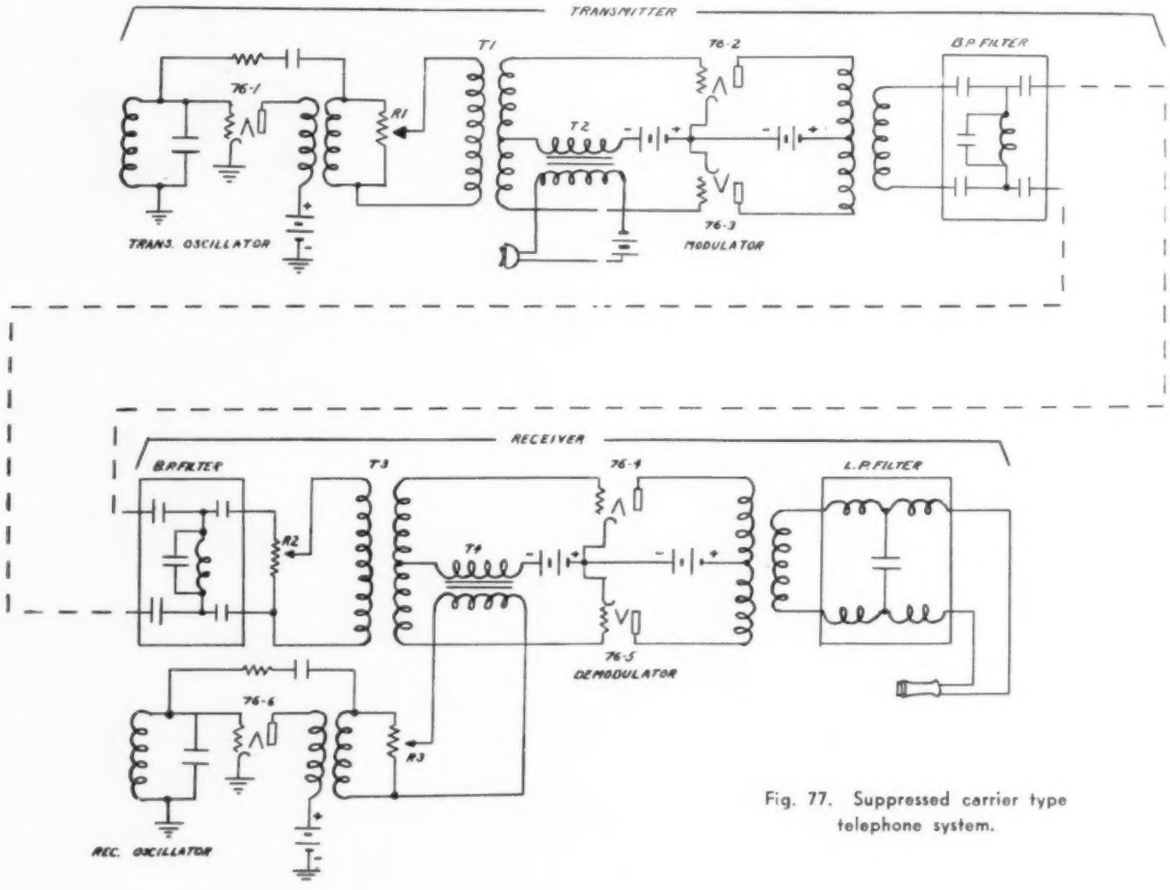


Fig. 77. Suppressed carrier type telephone system.

this oscillator is connected to the modulator tube (18-1) through a control potentiometer R-1. This tube has sufficient negative grid bias by means of battery C-1 so that when no carrier energy is applied as when R-1 is on zero the plate current is practically zero (see Fig. 57). When the tube is so biased and supplied with carrier voltage from the oscillator through potentiometer R-1 the output through the high pass filter varies directly as the grid bias. For example, the normal bias on the 18-1 tube is about 25 volts. Assume the potentiometer is adjusted so that the output of the 18-1 tube through the high pass filter is +10 db. Now if the bias is increased to say 35 volts we would find that the output had dropped to approximately –20 db. If the grid bias is reduced to 15 volts we would find the output increased to approximately + 16 db. Therefore, by inserting a transformer (T-1) connected to a telephone transmitter and battery in series with the C battery (C-1) we can vary the grid bias in accordance with the voice signals and thus control the carrier output.

At the receiving end we amplify the carrier energy to compensate for the line loss using the 76-2 tube and its control potentiometer (R-2). It then passes to the demodulator circuit consisting of the 18-2 tube. This tube is also biased so that with no signal the current is practically zero, the same as the modulator tube. When the modulated carrier passes through this tube to which is connected a low pass filter we obtain the modulating frequency in the same form as originally applied to the modulator tube at the transmitting end. The output of the low pass filter is shown connected to a telephone receiver which obviously produces the voice signals impressed upon the transmitter at the sending end.

● In the suppressed carrier circuit shown in Fig. 77 the modulator consists of two tubes connected as in a push pull amplifier circuit except that the transformer (T-1) winding is so connected that the voltage applied to the grids of the 76-2 and 76-3 tubes oppose each other resulting in no output. Now when modulating voltage is applied through the transformer T-2 the balanced condition is upset and side band energy will be transmitted out on to the line through the band pass filter. By properly designing this filter only one of the side bands will pass.

At the receiving end the single side band energy is applied through a similar circuit except that instead of a transmitter in the bias control circuit (T-4) the carrier frequency oscillator is connected. Transformer T-3 is connected in the same manner as transformer T-1 with respect to windings. With such an arrangement the side band signal from the line together with the receiving oscillator energy supplied by the 76-6 tube combine in the demodulated circuit (76-4 and 76-5 tubes) to produce the original modulating frequency at the output terminals of the low pass filter.

The above explanation does not attempt to cover the theory behind the various tube functions as a rather complete knowledge of vacuum tube operation is necessary to understand just what takes place. Those who are interested may find a complete description in Alberts book on "Electrical Communication".

● For the complete telephone circuit there must be two carrier channels, one for each direction of transmission. In other words at each terminal we would have a carrier transmitter and a receiver. In order to connect the carrier equipment to a telephone we make use of the hybrid coil arrangement used in a telephone repeater (see Chapter XI Fig. 58). A schematic diagram showing the connections of a carrier terminal is illustrated in Fig. 78. This shows the arrangement for a single channel carrier telephone together with the low pass filter required for the physical telephone circuit. If additional carrier equipment were used it would be connected in parallel with the existing equipment as indicated.

Several methods of signaling may be used depending on the requirements. In the case of the carrier and single side band type circuit, signaling may be accomplished by interrupting the carrier energy. This scheme may be adapted to special requirements such as might be occasioned by selective ringing using selectors or automatic PBX operation. The suppressed carrier type is not adapted to simple signaling such as the above and generally requires a voice frequency ringing system such as described in Chapter XIII. While this is somewhat more complicated than with the other scheme very satisfactory operation may be had.

(To Be Concluded)

John H. Agee Family To Have Extended Tour

Accompanied by Mrs. Agee and their son Richard, Mr. John H. Agee, vice-president of the Lincoln (Nebr.) Tel. & Tel. Co., and president of the United States Independent Telephone Association, will embark May 28 from Montreal aboard the *Duchess of Athol.* Landing first in France and visiting Italy, Switzeland, Germany, England and Scotland, their return is slated for the last of July on the *Queen Mary.*

Combining business with pleasure, Mr. Agee will visit the various exchanges and manufacturers during the trip. Affiliates of the Automatic Electric Company will be visited and inspected.

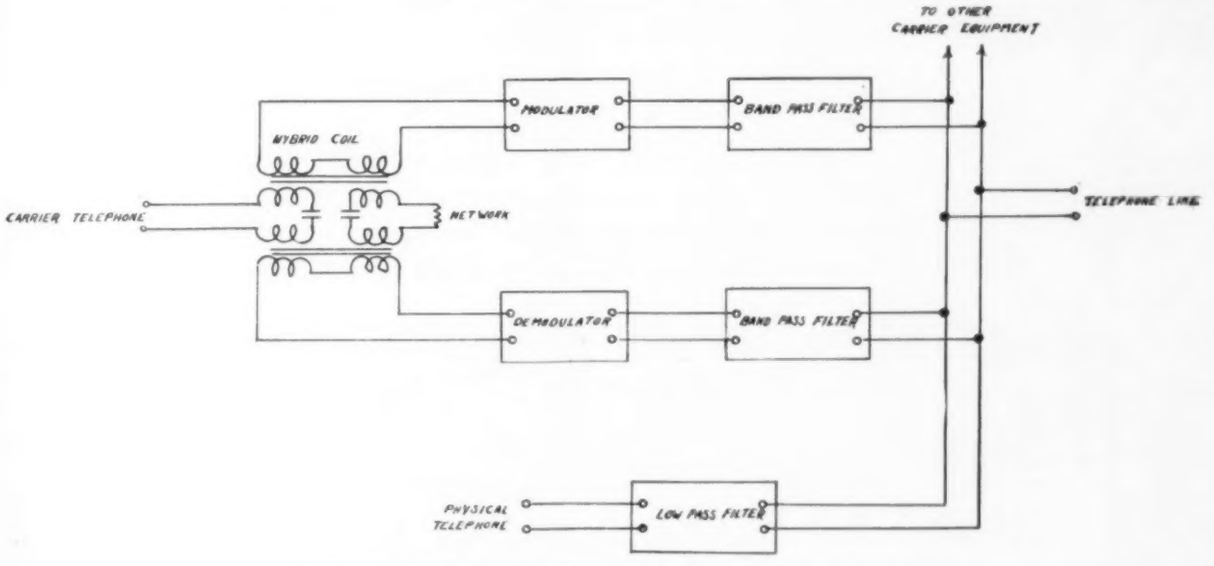


Fig. 78. Schematic diagram of carrier telephone terminal equipment.

Editorial « « «

We get a big kick out of the hullabaloo raised in the recent hearings of the Federal Communications Commission in connection with the allegation (or inference?) that the American Telephone & Telegraph Company and Bell System Companies maintain lobbyists in state capitols and in Washington.

Of all people to make a big fuss over lobbying, government, whether it be federal, state or local, should be the last to do so and should be the least heard from on the subject.

The lobbying activities of national and state administrations in attempting to get legislatures to pass "must" bills have been publicized and are well known. Now, along comes a newspaper clipping telling of a mayor of one of the largest cities in Iowa employing a lobbyist for the city administration in the interest of legislation endorsed by the League of Iowa Municipalities.

The right of or the need for government to maintain lobbyists are points not argued here—but it does seem to us that for a governmental agency to endeavor to make a "headline" issue of lobbying and to point a finger of scorn at private business for having representatives watching the progress of legislation—whom we shall call lobbyists—is out of place as long as government is probably the biggest offender.

If lobbying is to be deemed unethical and if it should be abolished, then government from the president, governor and mayor down should set the example before private business is criticized for carrying on such activities.

To date government apparently has put its stamp of approval on such activity.

DY SERVICE ON THE FOLLOWING ITEMS: Lead cable—line wire—drop wire—poles—kets—wood pins—pole steps—construction tools—belts and climbers—pole line hardware—orage batteries—cable terminals—switchboard protectors—substation arrestors—a complete nes, including magneto and central battery, manual and automatic types—etc., etc.,

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Value-of-the-service Factor in Utility Rate Making

By GEORGE J. EBERLE
General Commercial Engineer, Western Operating Properties
General Telephone Corporation
Los Angeles, California

PART III — Continued

In the previous articles the author discusses various concepts of value of service and their application in rate cases. In the present article the author continues his analysis and reaches the conclusion that value of the service is a potent force in pricing utility services, but that vigorous and exacting research and study are required to develop its potentialities and fullest usefulness. Reprinted through courtesy of PUBLIC UTILITIES FORTNIGHTLY.

● Under the previous discussion, Part I, reference is made to an article by Clyde Olin Fisher, in which he severely criticizes the Connecticut commission for ignoring value of service as a factor in rate making. Mr. Fisher testified for the consumers in this Ansonia Water Case and in the Portland Water Case. In his article he measures the reduction in purchasing power of the consumer during a period of years by the decrease of such indices as bank debits to individual accounts, bank deposits, and employment, and the increase in unpaid property taxes and relief expenditures which are then compared with the changes in gross revenue of the utility. The indexes of decreased purchasing power disclosed a much greater variation than the reduction in utility revenues during the depression. He concludes therefore, that the utility has collected such a larger proportion of the consumer's dollar that the charge has exceeded the value of the service. His general and specific statements are as follows:

> If the utility corporation during a period of greatly decreased purchasing power collects from its customers a sum of money which represents a greatly increased portion of their purchasing power, the company is charging in excess of the value of the service.
>
> If there is any validity in the principle that a public utility is charging in excess of the value of the service rendered by it when over a period of years, with no substantial change in the quantity or quality of services given, it attracts to itself an increasing portion of the consumers' purchasing power, it seems conclusive that in 1933 the Portland Water Company was charging for its service a price in excess of the value to consumers.

● Mr. Fisher infers that value of water service decreased with the reduction in buying power, or ability to pay, in fact decreased to such an extent that the price was in excess of the value of water service. This is erroneous in the light of the foregoing discussion.

The value of water service to most individuals, subjectively considered, was just as high during the depression as during prosperity, probably higher. What really happened was that due to decreased income the margin between the ability to pay and the price, or cost of water to the consumer, had decreased, but evidently not to the breaking point because the revenues of both utilities were well maintained during the depression. If it were true, as Mr. Fisher claims, that the price charged was in excess of the value of the service, then the curtailment of water consumption would have been drastic because consumers will not pay for long in excess of the value of the service.

The commission and Mr. Fisher both appeared to miss the point that not water alone, but all other necessities such as food, clothing, and shelter had taken an increased portion of the consumers' dollar, and there is no reason for singling out utility charges as being outstandingly oppressive. The Federal administration in fact tried to increase prices to the 1926 level during the depression and thus increase the burden of necessities.

Since the Connecticut commission holds that cost of service determines value of service, and since Mr. Fisher in his article criticizing the commission does not differentiate between ability to pay and value of service, we reach the ridiculous situation where the three concepts are considered basically the same.[16]

The margin referred to is generally not understood. In another electric case where the rates to large power users yielded little profit and the rates to small domestic and commercial users were noncompensatory, but still the utility earned in excess of a fair return, the commission stated that the other electric rates must exceed the value of the service. The statement was:

> . . . the electric utility is earning substantially in excess of a fair return, there is no escape from the conclusion that the rates in between those named must be high rates, and the inference is clearly supported that they are in excess of the reasonable value of the service.[17]

The high rates so condemned had probably been in force for a long time, and they were not in excess of the value of the service, but what the commission should have said is that the margin between the price paid and the value of the service of these high rates was much smaller than such margins of the various low rates, and therefore, discrimination existed and rectification was necessary.

[16] *Journal of Land & Public Utility Economics*, February, 1935.

[17] Alabama Public Service Commission v. Birmingham Electric Co. P.U.R.1932D, 148, 163.

● It would appear reasonable to assume that prices paid for utility service over a period cannot be higher than the value of the service, even under certain monopoly conditions. This thought has been expressed by the public service commission of West Virginia when it stated that a rate should never be increased above the maximum limit of the reasonable value of the service rendered.[18]

Where the cost of service, as measured by bare out-of-pocket costs, is above the value of the service, or, stated in another way, where the value of service to patrons may be less than such costs, the particular service, or, if it applies, the whole utility, is in jeopardy and faces abandonment. A commission confronted with these conditions should insist upon charging minimum cost rates for particular services if it is at all possible, and, in the case of the whole utility, make a thorough investigation to determine whether the utility is suffering from general inefficiency of operation, or is woefully weak in sales effort, or should regrade its service to fit the classes of purchasing power, or improve it so it is worth more. The utility, as has been formerly stated, may be suffering from past overextensions and overcapacity, thus its rates may have to be below any type of cost to meet the value of service standard either for all services or for particular ones.

● In a telephone case a commission states that cost of service is the only standard and refuses to consider the value of service concept under any consideration.[19]

Much the same criticism which applies to the above statement applies to the former quotation of the New Brunswick commission. However, the latter statement is more drastic, and hence the position more untenable, because the commission first absolutely discards the value of service basis and then states that cost of service is the only measure for rate making. The opinion of the commission in that case which states that value of service to some consumers is less than the price paid no matter how low the rates were made is in error. As stated previously, possibly such a condition could exist temporarily, but not indefinitely. In fact, the commission contradicts itself in the same decision and upholds the value of the service principle unequivocally when it states:

> Statements that any service is worth nothing may be dismissed without consideration. Men do not apply nor continue to pay for that which is worth nothing to them. It is important, however, that a charge be just, whether great or small.[20]

It was held in a gas case that rates for lighting and heating should be the same regardless of the value of the service because, "The cost per unit to the company is no greater for one class of service than for the other." Then the commission quotes the Pennsylvania Supreme Court with approval as follows:

> The regulation in question seeks to differentiate the price according to the use for heating or for light. It is not claimed that there is any difference in the cost of the product of the company, the expense of supplying it at the point of delivery, or its value to the company in the increase of business or other ways. . . . The real argument seeks to justify the difference in price solely by the value of the gas to the consumer as measured by what he would have to pay for a substitute for one purpose or the other if he could not get the gas. This is a wholly inadmissable basis of discrimination.[21]

● One does not care to imagine how the use of public utility services would be restricted if the edict of these decisions were made the absolute law of the land in rate making; namely, that if costs are equal rates should be equal regardless of the value of the service. Such rigidity of policy destroys all the fine points of pricing utility services and would reduce the consumption to such an extent that the cost per unit to all consumers would be higher. Developmental or promotional rates could not be charged because both value of service and ability to pay could not play a part in determining rate schedules.

Holding that comparisons of the values of various services in use by the consumer or the commission are not permissible as a factor in determining rates, the state corporation commission of Virginia in the following quotation strikes at the very heart of the value of service concept. It also confuses the cost of service with the value of service, stating that the former measures the latter. In its decision involving an application for an increase in rates by the United Feul Gas Company, the commission said:

> In this connection counsel for applicant argue that natural gas, by reason of its recognized value as a fuel for certain industrial enterprises, and on account of the added comfort and convenience incident to its use as a domestic fuel as compared with other available fuels for that purpose, the gas as such possesses an intrinsic value inherent in its natural characteristics that should be taken into consideration in fixing the rates to be paid therefor. We could apply the same argument in favor of electricity as a more desirable substance for heating and lighting purposes than gas. However, we are clearly of opinion that, in fixing rates for natural gas, we should not be guided or influenced by the fact that it is more desirable as a substance for heating and lighting than other available fuels, but should only be guided and controlled by the reasonable value of the service rendered and commodity supplied. This value should be such as will secure to the producer a fair return for its investment and enterprise, and at the same time be within reasonable limits, such as the consumer can afford to pay.[22]

● How can value of gas service in this case be determined without making comparisons with other light and heat agents? Whether the domestic consumer, for example, will use gas as fuel for cooking depends upon his comparative appraisal of all other fuels available, such as wood, coal, peat, petroleum, kerosene, gasoline, electricity, etc. He measures their heating efficiency, the convenience of handling, freedom from odors, cleanliness, and safety. He considers the prices or costs and his ability to pay. Finally decides upon a purchase. The fact that he considers prices does not mean that it is a factor in determining value of service. Of course, when the question of changing fuels confronts a consumer, he considers not only the prices of the various fuels, but the cost of converting or purchasing new appliances, the continuity of the supply, the probable changes in prices, as well as other matters either tangible or intangible.

[18] Vol. 4, P.U.R. Dig. 3137.

[19] Oregon Public Service Commission, in *Re* Pacific Teleph. & Teleg. Co. P.U.R.1922C, 248, 258.

[20] *Re* Pacific Teleph. & Teleg. Co. *supra*, at p. 269.

[21] Bailey *v.* Fayette Gas-Fuel Co. (1899) 193 Pa. 175, 183; P.U.R.1915E, 763, 790.

[22] P.U.R.1918C, 193, 236.

¶ *"It would appear reasonable to assume that prices paid for utility service over a period cannot be higher than the value of the service, even under certain monopoly conditions. This thought has been expressed by the public service commission of West Virginia when it stated that a rate should never be increased above the maximum limit of the reasonable value of the service rendered."*

Effect of Ability to Pay on Rate Making

"In theory ability to pay attempts to fix rates so as to collect utility revenue with he least effort on the part of the company because of the unwillingness of consumers to part with their money is reduced to a minimum, or stated in another way, the willingness of consumers to pay is at a maximum. This psychological factor is more important than is often realized since it influences the whole undertone of public relations."

In the following quotation the inference is that ability to pay and value of service in production can be used interchangeably:

> There is another side to this question, that which concerns the exaction of higher rates from those whose ability to pay is greater. This has occurred, to some extent, on the railroads, but the trend is away from it and toward the cost of service principle. In a 1921 case, the commission admitted that, where the value of the service permits, some high-grade commodities carry more than their share, so that low-grade commodities necessary to existence might be transported, but held that this did not establish the rule that rates should be based on the value of the service to the shipper. It is doubtful whether ability to pay has been accorded as much recognition in the other public utilities as has been given it in the field of rail transportation.[23]

● In the creation of place utilities by transport there is a close relation between ability to pay and value of service. Furthermore, the value of service can be quite definitely measured in money where place utilities are used in further production. But this is not true in all cases of creating place utilities. The value in use of such commodities as industrial coal, sand, gravel, rock, lumber, and cement after transport is quite definite, and the ability to pay depends upon this value, but the movement of the office records of an industrial concern from one city to another has aspects of intangible values which cannot be measured accurately and the ability to pay for such service is not so closely related to these values.

Water used as an ingredient in a product offered for sale has a definite value in use and the ability to pay depends upon that use, but water used to clean the factory premises, or water the lawns, is in a different category.

Where gas and electricity are employed as industrial power the ability to pay depends upon the money value in use, however, gas or electricity used for display lighting has intangible values which defy specific measurement. When personnel is moved to create good will, or maintain or improve public relations, there can be no percise gauge of value. Communication service saves time and transportation costs of personnel and the value is therefore tangible, yet many parts of telephone and telegraph service in business are intangible such as the value in emergencies.

From this analysis it is clear that ability to pay and value of utility service in business are almost identical in some cases, while in others they are as different as in individual consumption. Where the two are closely related and definitely measurable the pricing of utility services must be much more exact than where they are incommensurable and intangible. Generally the terms or concepts should not be used synonymously.

● In the Wisconsin Telephone Case the Wisconsin Public Service Commission stated that, "The ratio between the charge made for a utility service and the income of the general public available for such payments is another measure of value of service."[24] It may be contended that this ratio is not a definite measure of the value of service in intimate consumption. Three constituents enter into this relationship—the family income, the telephone charge, and the value of service objectively measured. A change in any one constituent, obviously, will effect the relationship.

Various analyses of the absence of, or probable relationship between, the ratio of the telephone charge to family income and the value of service suffice to establish the weakness of such a measure of value of service in intimate consumption proposed by the Wisconsin commission, and at least signify that further extensive study is required to fashion more appropriate measures. Furthermore, this ratio is likely to be a more unsatisfactory measure of potential value of service to the domestic consumer, although the commission evidently had in mind only actual value in use.

● Now, as to the appropriateness of the ratio of telephone charge to business income as a measure of actual value in use in further production, it may be stated in an off-hand way that the relationship is much closer, and therefore, more representative.

The business income may be indicative of ability to pay, and ability to pay is in turn dependent to a considerable extent upon the value in use of utility services. However, the profitableness of a business, or the proportion of gross which is net, may not be shown by the size of the gross alone, and hence, the ratio of utility charge to gross income may inaccurately measure the value of service in use to the enterpriser except as the gross is a measure of the quantity of utility service required. Clearly, additional study and investigation is necessary to test the statements just made, and whether the ratio is applicable as a measure of value of service in business use.

Relative to governmental and non-profit institutional consumption of utility services the ratio of charge to income as a measure of value of service has against it all the arguments outlined under intimate consumption when utility use is for intangible purposes, and all the arguments suggested under business consumption when the utility use is for production of tangible things.

● In another part of the decision the Wisconsin commission, after showing the large loss in telephone stations during the first five months of 1932 as compared with a similar period during the previous three years, made the following statement:

> This indicates, in a concrete way, that the rates were in excess of the value of the service to these subscribers who discontinued their service or were disconnected.[25]

(Please turn to page 32)

[23] *Journal of Land & Public Utility Economics*, August, 1933, pp. 264, 265.

[24] P.U.R.1932D, 173, 264.

[25] P.U.R.1932D, 173, 265.

¶ "SUCH *rigidity of policy* (RATES FIXED STRICTLY ON BASIS OF COST OF THE SERVICE) *destroys all the fine points of pricing utility services and would reduce the consumption to such an extent that the cost per unit to all consumers would be higher. Developmental or promotional rates could not be charged because both value of service and abilty to pay could not play a part in determining rate schedules.*"

LINE and DESK

RAY BLAIN, Member A. I. E. E., Editor

Q. Is it considered necessary, in the interest of safety, to always heat Beeswax and Paraffin outside of buildings?

A. This action should naturally be governed by local conditions though unless certain dangerous fire hazards exist we are of the opinion that beeswax and paraffin may be safely heated inside of buildings. Kettles used for this purpose should be equipped with close fitting covers which may be quickly closed in the event that the beeswax or paraffin ignites.

Q. Do you consider a pre-cast concrete cover satisfactory for a small telephone manhole?

A. This in our opinion would depend upon the size and location of the manhole. We would not recommend this type of cover for any manhole located in a street in the path of present day traffic. Considering the very low cost of the approved type cast iron manhole covers we would recommend their use in preference to the suggested pre-cast concrete covers.

Q. What is the main advantage to be gained by the use of the three winding induction coil in the modern subscribers set?

A. This is a slight modification of the standard boosters circuit though some claim that it has certain advantages beneficial in the reduction of side tone. This is claimed to be due to the fact that variable currents generated by the transmitter of the telephone, are in opposite direction in the induction coil winding to that of the line winding of the induction coil. This tends to cause the currents to neutralize in the third, or receiver winding of the induction coil.

Q. What type reel is considered satisfactory for use with parallel type drop wire? We desire a reel to be used in stringing and taking-up this type wire.

A. There are several types of reels on the market, all of which will be found entirely satisfactory for use with parallel type wire. One such reel which we have used and approve of is an all-metal type which may be clamped on one side of a light installation truck. It may also be removed and used in either a vertical or horizontal position. This reel is also equipped with a variable tension brake which may be set to control the speed of the reel when pulling-out wire. The reel is light in weight though strong and rigid.

Q. Is a pole derrick considered satisfactory for pulling poles out of the ground in ordinary soil?

A. Yes if it is used properly. The middle leg of the derrick should be used as a "stiff leg" by resting the end of it which ordinarily sets in the middle of the truck body, on a foot plate placed at the butt of the pole. The winch line should run over the pulley in the upper end of the derrick, then down and through a snatch block lashed to the pole being pulled, within reach of the ground. The line should then be run back to the top of the derrick and anchored. As a safety precaution to avoid possible injury to winch or derrick, a rope sling with a breaking point of 10,000 pounds or less may be used to lash the snatch block to the pole.

Q. We have several long cable runs to make on a wood lath and plaster ceiling in a basement and would like to know the best means of fastening the cable cleats?

A. The cable cleats may be attached direct to the plaster providing care is observed to set each screw in a lath. To avoid damage to the plaster we suggest the use of a small electric or hand drill to locate the lath and provide a small hole to start the screw. When the location is such that it does not prove unsightly use 1" x 4" boards to provide a run for the cable. This size board in lengths of about 12 ft. may be attached to the lath and plaster ceiling with about three 2" No. 12 screws. The cable may then be conveniently and quickly cleated to this board.

Q. How should the ends of new cable be sealed in manholes while awaiting the splicer?

A. New cable should always have both ends sealed immediately after it is cut at a manhole. Make use of a hammer and bolt, or better yet a piece of hardwood somewhat like a section of a hammer handle, to beat the conductors back about ¾ of an inch from the end of the lead sheath. All paper around the inside of the lead should be removed. Cover the lead well with stearine and fill with hot solder and smooth out with a hot soldering iron. Another method is to beat over the edges of the sheath after the conductors have been pushed back and paper removed and then fill with hot solder. Some favor one method and some the other but both are believed entirely satisfactory.

Q. The plates in two cells of our five year old storage battery are rapidly becoming unserviceable. Do you think their replacement advisable or should we purchase an entire new battery?

A. We would say that this will depend upon the condition of the other cells of the battery. We have known of cases where a company would replace about two cells yearly until a complete new battery had been purchased. In such case it would seem desirable to have purchased a complete new battery at one time. In your case though if it is thought that the other cells are good for three or more years service, then the repair of the two cells would seem to prove desirable. The manufacturer of your battery we are sure would be pleased to advise you in this matter if you will furnish them the true facts of the case.

Q. In what colors may handset type telephones now be obtained?

A. The colors ordinarily available are mahogany, walnut, black, chinese red, old ivory, jade green, nile green, royal blue, orchid and maroon. The metal fittings of dial, cradle and hand unit bands are usually available in chromium plate, highly polished, or in heavy pure gold with a satin finish.

(Please turn to page 35)

266 Branford Street,
Hartford, Conn.
March 11, 1937

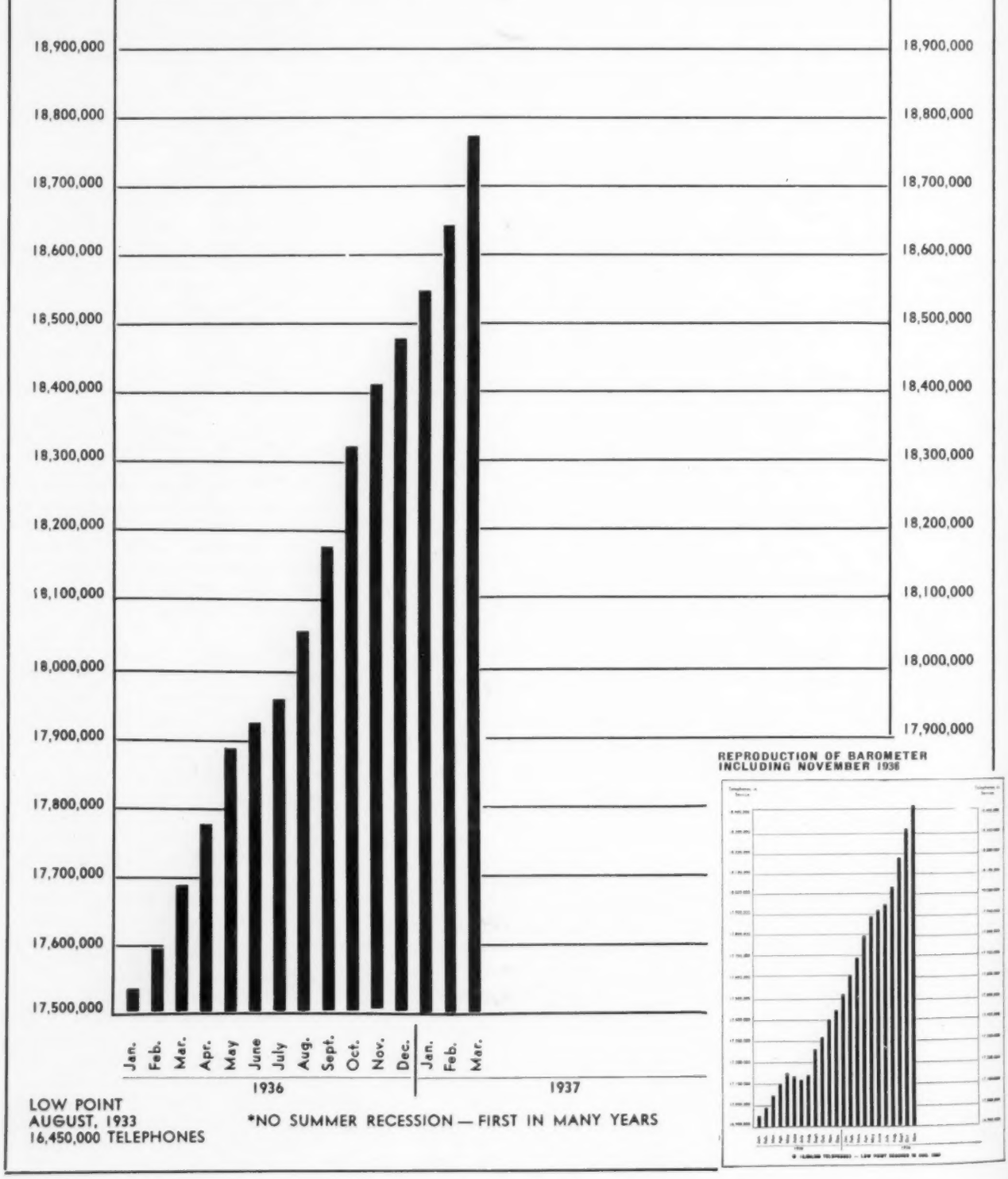
Dear Sir:

I have just had the pleasure of reading several copies of the "Telephone Engineer" which a friend of mine let me take.

Enclosed you will find money order for $1.00 for which please enter my subscription to the "Telephone Engineer" for one year.

Yours, sincerely,
A. J. Eagen.

Monthly Telephone Station Barometer



REPRODUCTION OF BAROMETER INCLUDING NOVEMBER 1936

New Telephone Building

(Continued from page 16)

opened on March 9 with all civic organizations taking part. The open house was followed by the featured newspaper in its issue of March 12.

Greeting the celebrants and especially the local members of the Lions Club who fostered the movement for the new building were Judge S. A. Lindsey, president, Oscar Burton, general manager, and Mr. Burtons' assistants S. J. Neel and E. L. McKnight, all of Tyler, the company's headquarters. Assisting were the local staff.

This new development of the Gulf States Telephone Company is only a continuation of the aggressive policy the company has pursued under the able direction of Judge Lindsey and general manager Oscar Burton. The entire project will be of inestimiable value to the company not only by better facilities but in the good will of the press and the pride of its citizens in their progressive telephone exchange.

Another Income Gain Reported

● General Telephone Corporation, constituting one of the largest groups of telephone companies in the United States outside the Bell system, reported consolidated net 1936 income of $1,299,911, after all charges and taxes, including undistributed profits tax. This represents an increase of $313,-961, or 31.8 per cent over the previous year.

John Winn, president of the corporation, in his letter to stockholders, pointed out that although gross operating revenues of $11,962,328 were 8.1 per cent higher than for the previous year, consolidated net operating income showed an increase of only 2.6 per cent, largely due to increased taxes. As a result however, of lower fixed charges resulting from subsidiary refunding operations carried out during the year, the net earnings available for General Telephone Corporation preferred and common stock were up 31.8 per cent.

The unconsolidated income account of General Telephone Corporation alone showed total income of $1,188,-656 and net income after all charges and taxes, $1,019,086. Income from senior securities of subsidiaries more than covered its own preferred stock dividend requirements of $220,539. The balance of income was $798,548, applicable to its 700,650 shares of common stock.

Operating subsidiaries of the corporation gained 19,941 telephones, an increase of 6.35 per cent for the year.

No. 62 C.B. Handset

"Moulded of Durez"
the Modern Plastic, which retains its beautiful finish after years of service.

"BUILD Future Business with Leich Handsets"

No. 70 Magneto Handset

LEICH
HANDSETS ARE STANDING-UP*

*Subscriber Approval

COMPANIES USING LEICH TELEPHONES HAVE THIS TO SAY:

"BETTER TRANSMISSION"
"STOCK REDUCTION"
"CUTS MAINTENANCE"
"MODERNIZES EQUIPMENT"

Write for Prices

Designed - Engineered
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by

LEICH
Electric Company
Genoa Illinois

A GRIP FOR ALL NEEDS

No. 1628-5 B. "Chicago" Grip. Maximum opening .563. Minimum opening .115. Safe Load, 8,000 lbs.

Here's the new "Chicago" Grip capable of handling messenger or guy strand from 3/16 in. diameter up to 1/2 in. diameter. A genuine all purpose grip that can also be used satisfactorily on bare conductors, solid or stranded, from No. 6 to No. 4/0 seven strand copper and A.C.-S.R. up to No. 3/0. A grip that even satisfactorily handles the new three-strand "copperweld" conductor. The bronze-lined jaws prevent slippage. This new grip will afford a sure hold under all conditions, with loads up to 8,000 lbs.

DISTRIBUTED THROUGH JOBBERS

Foreign Distributor: International Standard Electric Corp., New York

The four pamphlets listed below will be sent without charge to anyone interested. Check the ones you want:

- ☐ Safety for the Pole Climber.
- ☐ Specifications on Linemen's Belts and Safety Straps.
- ☐ The Safety Factor on Linemen's Leather Goods.
- ☐ Pocket Tool Guide.

Mathias KLEIN & Sons
Established 1857 Chicago, Ill. U.S.A.
3200 BELMONT AVENUE

"Tapping In" On Washington

(Continued from page 15)

the company. The price index method of valuation was assailed on the grounds that the commission had kept secret from the company the indices used and that the Supreme Court itself has ruled against such a method in the Maryland rate case. Another important point of attack was the commission's finding on depreciation which the company contended disregarded actual retirement losses and experience of the Ohio Bell during the period of rate investigation. Probably a highlight phase was concentrated upon the disallowances ordered by the Ohio commission in the license contract payments of the Ohio Bell to the A. T. & T., which has been a major subject of the FCC Telephone Investigation and the Supreme Court's decision on that question will mark the first judicial ruling on the question since the FCC started its probe over a year ago.

● The Ohio Commission in its judgment, presented by Attorney General Herbert S. Duffy, defended its price indices method of valuation because it had first established a tentative valuation in 1925 and then kept that valuation current through established price trends of which it argued the most important were Western Electric prices for telephone apparatus. The state commission held that it had not disregarded any useful or used telephone property in its valuation but had given proper weight to $3,256.000 worth of real estate after it had been placed in use and had not placed going value in a separate category but had considered it lumped into the whole valuation. The commission argued that it rightfully disallowed the 10.2 per cent increase of Western Electric prices in 1930 because that increase was contrary to the trend of manufacturing prices during the depression. The depreciation rates fixed by the commission were held to be equitable and sufficient to permit normal replacements of property.

In regard to its ruling on license contract costs, the commission contended in its argument that the allowances for the Ohio Bell had been made by it along the lines of the Illinois Bell case and stressed that the A. T. & T. was engaged in varied and many-fold activities in overseas telephony and non-telephonic enterprises which should not be charged to the operating telephone company. The rate refund was defended as not excessive but only representing 89 per cent of the total rates held to be excessive by the commission.

Argument by the Ohio Bell was presented by W. H. Thompson and Karl Burr. For the commission Donald S. Power and W. W. Metcalf, assistant attorney general.

On basis of severe questioning by justices indications were that the supreme court would rule against the commission as the justices seemed to view failure of commission to disclose price trend data to the company as lack of due process and to be dissatisfied with the commission's failure to value property of the Ohio Bell in each exchange where rates were protested.

"Interferences" and "Conclusions" Claims Garrett, Ind. . . .

The use of "inferences" and "conclusions" rather than actual facts about the operations of the company to form the basis of the FCC order holding "Bell control" was a charge made by the Garrett, Ind., Telephone Company, an Independent, in its appeal to the Commission's Telephone Division from the latter's finding that it was controlled by the Indiana Bell Telephone Co. The Division had held that the Garrett company was under the Indiana Bell's domination, because the latter owned 50 per cent of its common stock. According to the Garrett company, it conducted its operations entirely free from control of the Indiana Bell and had in the past gone counter to views expressed by Indiana Bell officials who were on its board of directors.

Kellogg Directors Announce New Executives

In a statement to the press, President George A. Yanochowski, president of the Kellogg Switchboard & Supply Company, has announced the election of three new vice-presidents by action of the Board of directors on March 30.

Elevated were: H. E. Billington, vice-president in charge of sales; L. B. Fauer, vice-president in charge of manufacturing; and George R. Eaton, vice president in charge of engineering.

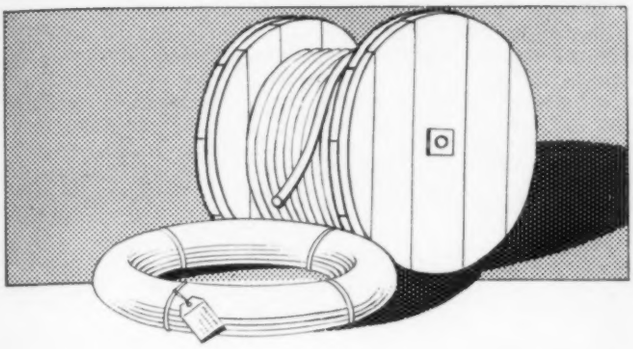
All of these executives are well known to the industry as their company is one of the pioneer companies serving the independent industry. At the same meeting Mr. C. F. Reynolds was elected assistant treasurer, retaining his former title of assistant secretary.

Higgins Family To Tour Europe

Mr. P. Kerr Higgins, long time successful telephone exchange owner, University City, Mo., accompanied by Mrs. Higgins will sail on April 23 for an extended visit to England, Scotland, Wales, Ireland, France, Belgium, Holland, Sweden and Germany.

Taking their car to be better equipped for their travels, this much traveled pair will have 3 months for the trip with return scheduled for July 30th.

PHILLIPS



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Phillips products include every type of wire and cable required for telephone, telegraph and power work.

Made in the most modern of shops by workmen long experienced in the fabrication of only the highest quality products, Phillips wires, cords and cables may be relied upon to deliver the maximum in reliability and performance under all conditions.

Telephone managers are invited to try Phillips products under actual working conditions and experience first hand the outstanding merit and long-lived dependability for which they are noted. Prices and full information gladly sent upon request.

Phillips Products Also Include:

A complete range of telephone instruments, telephone switching equipment for public and private exchanges, and telephone protective apparatus.

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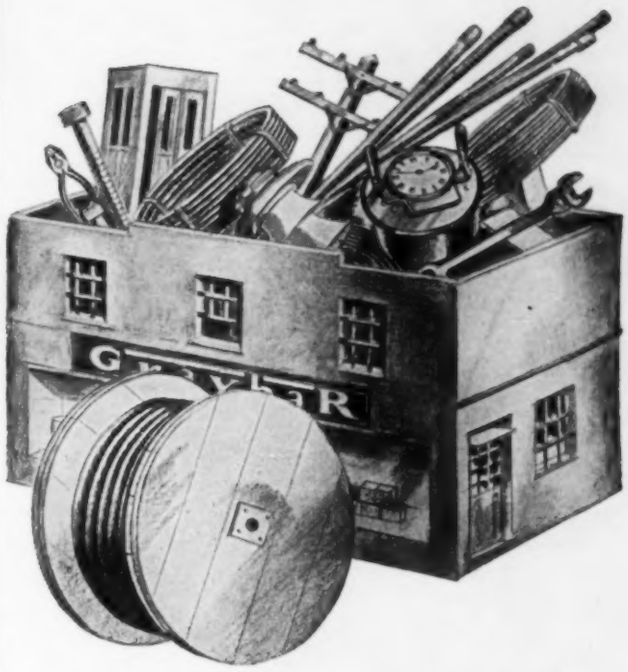
Factories: Montreal and Brockville. Cable Address: Philelec, Brockville. Distributors for Canada: Canadian Telephones & Supplies, Limited, Toronto, Winnipeg, Montreal, Regina and Vancouver.



Cable

...and 60,000 other items

WHERE dependability counts—only the highest quality electrical products will do. One such quality product is Western Electric Lead Covered Cable—a cable whose dependability is insured by the most exacting of manufacturing standards.

But that's not all. Out of its roster of 60,000 electrical items, Graybar is prepared to meet *any* need of a telephone industry. And behind *every* Graybar item stands the Graybar reputation for quality that goes back 68 years.

GraybaR

OFFICES IN 81 PRINCIPAL CITIES

EXECUTIVE OFFICES: GRAYBAR BUILDING, NEW YORK, N. Y.

Value-of-the-Service Factor

(Concluded from page 26)

Possibly some of the discontinuances were due to the fact that the rates charged were in excess of the value of the service, but the majority most likely were caused by the declining margin of satisfactions received from the expenditure of the telephone dollar as compared with the satisfactions which could be derived from other goods and services purchased for that same dollar; and stations were disconnected because the telephone dollar ceased to exist. The statement of the commission is too direct and inclusive.

Finally, in closing the section on "Value of Service," the commission uses this sentence:

> We further find that the services are not reasonably worth in excess of the rates fixed by this order.[26]

If the services, objectively measured, are not worth in excess of the rates fixed by the order no one would purchase them by all the tenets of consumption economics, because no one is interested in trading dollars. The buyer wants and is entitled to that often-mentioned margin above cost. What the commission should have said is that the rates ordered permit an adequate, or reasonable, margin of value in use above the cost of the subscriber. (This statement raises the question as to the meaning of subscriber—domestic, business, or governmental?)

● That the burden of a rate structure should fall upon those best able to bear it, is to apply a principle of taxation to rate making. The relationship between the outlay for utility service and the size of the individual or family income, or the business profit, has definite application. Even the condition of municipal income or budget may be a factor in fixing utility rates for cities.

Measurement of ability to pay is difficult, but there are general standards which can be adopted that will form a groundwork for the approximation and application of this concept. The classification of consumers should be based not only upon the broad differentiation of uses and costs, but also upon the various capacities to pay. Within a particular class of consumers the determination of steps of rates should take into account the income groups.

In theory ability to pay attempts to fix rates so as to collect utility revenue with the least effort on the part of the company because the unwillingness of consumers to part with their money is reduced to a minimum, or stated in another way, the willingness of consumers to pay is at a maximum. This psychological factor is more important than is often realized since it influences the whole undertone of public relations. Just like taxes, utility revenues should be obtained with the least friction, or to use a simile, should be extracted as painlessly as possible.

[26] P.U.R.1932D, 173, 265.

Our Refinement of Cost of Service

"It is probably no exaggeration that if the time, energy, and funds which have been needlessly spent upon the overrefinement of the cost of service principle, especially on repeated detailed inventoried appraisals, had been applied toward the perfection of the value of service and ability to pay principles the interests of the consumer, the utility enterpriser, and the public at large would have been advanced."

● To accord ability to pay its proper place as a determinant of rates much more factual data is required than is at hand at the present time. Domestic, agricultural, and institutional consumers, as a rule, have a lower capacity to pay than mercantile, manufacturing, and mining establishment. But data on income and profit groups should be at hand to apply further the taxation principle.

It is true that rates cannot vary with the financial circumstances of particular persons, or with the changes in their purchasing power from day to day, or month to month. This is palpably impractical. Such logic, however, does not discredit the whole ability to pay concept, because if this were so, the term "spread of rates" would be an empty phrase.

On the basis of ability to pay, numerous water, gas, and electric rates do favor the small domestic consumer; telephone rates do favor the residential, rural, and service line subscriber; freight rates do favor the low-grade commodities; street railway fares do favor the public and private school pupils; gas fuel and electric power rates do favor the industrialist able to employ competitive fuels and power, etc. In a telephone case the rates charged for single party telephone service exceeded the full cost of the service, and the differential between single party and multiparty service was greater than usual, because switchboard capacity was limited.[27] In an electric case where rates were increased because a shortage of water power existed, the commission stated that it placed the burden upon those consumers who use the service for profit and not upon the small domestic consumers.[28]

[27] (Wis. 1924) P.U.R.1925A, 806.

[28] (Nev. 1924) P.U.R.1925A, 456.

● It is apparent that the term value of service has been used loosely and misapplied in public utility rate making. There appears to be no differentiation between value of service to the domestic consumer, to the business consumer, or to the governmental consumer; nor between potential and actual, tangible and intangible, direct and indirect value of service. Some of the literature pertaining to public utility regulation and economics is replete with confusion of the value of service concept with cost of service and ability to pay. Proper discrimination is mostly lacking.

What courts, commissions, and utility rate makers should recognize is that value of the service and ability to pay should be employed to so enforce just discrimination by substantiating rates below the cost of service, at the cost of service, or above the cost of service for various classes and districts that utility usage attains its widest application ever approaching universal consumption, and that rates are balanced and equitably assessed. In other words, the concepts of value of service and ability to pay should be applied to broaden the base of cost of service from an out-of-pocket minimum to an above-total-cost maximum.

But the constitutional right to earn a fair return and practical economics demand that total cost, particularly of a utility system or corporate entity, be given first importance.

● Generally, the tenets of consumption economics are violated in discussions of value of service by ignoring subjective valuation and its attendant, the margin of satisfactions, or consumers' surplus. Value of service is a potent force in pricing utility services, but vigorous and exacting research and study are required to develop its potentialities and fullest usefulness. It is probably no exaggeration that if the time, energy, and funds which have been needlessly spent upon the overrefinement of the cost of service principle, especially on repeated detailed inventoried appraisals, had been applied toward the perfection of the value of service and ability to pay principles the interests of the consumer, the utility enterpriser, and the public at large would have been advanced.

Mrs. Marletta Bowman, Operator, Foils Burglars

As night operator for the Indiana Associated Telephone Corporation in their Elkhart (Ind.) exchange Mrs. Marletta Bowman is fast becoming known as the "watch dog" for that city. On March 16 her deed of notifying police through her close attention to her board resulted in the capture of two burglars in the Elkhart Public Library resulted in headlines in the Elkhart Truth. She noticed that receiver was off the hook and listening carefully heard footsteps and then the receiver was placed back on the hook. She immediately notified police who captured the culprits after an exciting chase.

On March 19 at 12:45 a. m., 35 minutes later than the hour of the burglar rout of Tuesday, she again noticed a receiver off the hook, this time at a commercial customer and her notification brought immediate aid and a fire was caught before it could gain much headway and cause heavy damage. Again she was honored by headlines for her watchfulness and her service to her community. Her application amply repays her for the many hours she watches while the city sleeps.

Government Installation

Three months were required to construct and install the telephone system of the new Department of Interior building in Washington. An additional month was needed to perfect plans for the cutover from the old system, and only 80 seconds were needed for the actual transfer.

So large is the switchboard that 3700 calls can potentially be handled at once. There are 19,880,000 feet of conductor wire in the telephone distributive system.

WILLIAMSPORT
STRAND has greater
Protection against
Weather-Wear
Heavier, flawless galvanizing — more uniform, non-flaking, firmly bonded — protects this strand. Lasts longer, postpones replacement.
We welcome comparative tests of Williamsport Strand.
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More Hours of Service

. . . that's what every telephone engineer seeks . . . *more hours of service* . . . which means fewer replacements, lower service costs! And that's exactly what Ray-O-Vac telephone batteries offer!

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MAIN OFFICES AND PLANT
MADISON, WISCONSIN
Additional Factories at Clinton, Massachusetts and Lancaster, Ohio

Kellogg To Build New Factory

The Kellogg Switchboard and Supply Company, 1066 W. Adams Street, has completed negotiations with the Clearing Industrial District for the construction and purchase of a million dollar plant in the Clearing District. This transaction is the largest building deal in the Chicago area since 1930.

The new Kellogg plant will be one of the largest in the Clearing Industrial District. It will occupy the entire block between 66th Street and 67th Street, fronting on the west side of Cicero Avenue. The factory will contain 310,000 square feet of floor space and will be erected on a ground plot measuring approximately 400,000 square feet. The present Kellogg plant contains 473,000 square feet.

The Kellogg Switchboard and Supply Company (advertisement pages 4-5) are manufacturers of switchboards, telephones and telephone accessories. The company devotes its energies to the development, manufacture and sale of telephone equipment for the independent telephone industry.

After incorporating in 1897, Kellogg grew out of its original Highland Park, Ill., factory in a year's time. The next move was to the corner of Congress and Green streets and, since 1915, Kellogg has peen located at the Adams Street site.

Officers of the company are George A. Yanochowski, president, J. G. Kellogg, vice-president and secretary, and H. C. McCluskey treasurer. "Our need for a one-story, continuous flow production plant, with anticipated manufacturing economies," Mr. Yanochowski said, "prompted this move."

Construction of the new million dollar plant will begin immediately. The land is now occupied but existing buildings will be torn down to make way for the new structure.

The new building will be of face brick construction, with stone trim. Served by the Belt Railway of Chicago, the plant will be equipped with two switch tracks and four truck docks, inside. The docks will have a capacity of eight trucks. With the exception of a two-story front section for offices, the entire building will be one-story in structure.

Negotiations were concluded by Mr. Yanochowski and H. Perry Phelps, vice-president of the Clearing Industrial District. Fred C. Foltz is the architect.

All contracts have been let and Clearing Industrial District, Inc., will start construction for completion by October 1. Kellogg will begin moving, in single units, after the first of October and expects to have the full plant in operation by April of next year.

George A. Yanochowski

The addition of Kellogg Switchboard brings the total number of factories in the Clearing Industrial District to 115 major industries.

Insurance Company Claims Hookup Record

Speaking from Baltimore (Md.) the officers of the Maryland Casualty Company addressed all of their branch offices over the nation early in March. To make a complete hookup wireless telephone was utilized that the Honolulu branch might be included. This method of conference has been used many times but a hookup of this magnitude is indeed rare and possibly it might be the record, or do we hear arguments?

Line & Desk

(Continued from page 27)

Q. What useful purpose do cable ducts serve and of what material are they constructed?

A. They are used primarily to protect cable sheath at the entrance of the ducts by absorbing creeping wear due to expansion and contraction of the sheath. These shields are ordinarily made of zinc though may be furnished in steel hot galvanized.

Q. Which is considered the best type of messenger suspension the through bolt type or the bracket which attaches to the pole with lag screws?

A. Both methods are considered satisfactory though perhaps the through bolt type is the one most generally used. The lag screws sometimes have a tendency to loosen. Contrary to the general belief of many the hole through the pole for the bolt does not weaken the pole appreciably.

Q. What type of transit is recommended for general telephone use?

A. A small transit and level of the metal tripod type can be purchased for less than $50.00. This instrument is small and compact and adequate for all general telephone work. This transit combines in one instrument the facilities for measuring both horizontal and vertical angles. This tool will be found useful on any construction job and will often make possible a better grade of work.

Q. What is considered the best method of marking poles in the line?

A. The method usually considered most satisfactory is zinc or aluminum letters and numerals which are attached to the poles with nails.

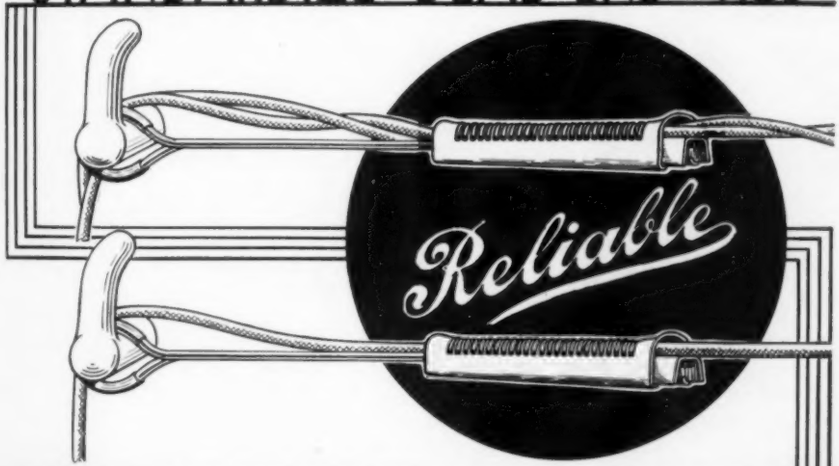
James A. Stice

James A. Stice, president of the National Trail Telephone Company, died at the Shelby County Memorial Hospital in Shelbyville, Illinois, on March 14th, 1937.

Mr. Stice was a pioneer telephone man in Illinois. About 1898, he became interested in the Waverly Telephone Co., later disposing of his interests there, and installing the first telephones of Gillespie. For several years he operated the exchanges at Gillespie, Benld and Virden, Illinois. In 1913, he disposed of this property to the Cheadle interests. The following year he purchased telephone property at Altamont and St. Elmo, Illinois. Later this property was enlarged somewhat by purchase of neighboring telephone exchanges.

His first wife, the mother of his two sons, died in 1924. He is survived by Mrs. Mabel Stice and the two sons, J. Maurice, attorney of Shelbyville, and Earl F., manager of the National Trail Telephone Co., residing at Altamont, Ill.

"STANDARDIZE DEAD-END TIES"



DROP WIRE CLAMPS

- The type "P" drop wire clamp is an ideal device for attaching No. 17 BS twisted pair or parallel drop wire to poles and buildings. It prolongs the life of the drop wire, permits free swinging at the tie, places all of the wear on the hardware and eliminates the sharp bends necessary with other methods.

This clamp is easily and quickly installed, making a very neat installation. Slack in drop wires can be taken up quickly without leaving any weak spots on the wire. Write for samples.

Reliable ELECTRIC COMPANY
OVER 25 YEARS SERVICE TO THE UTILITIES
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Crapo GALVANIZED PRODUCTS

Telephone Wire
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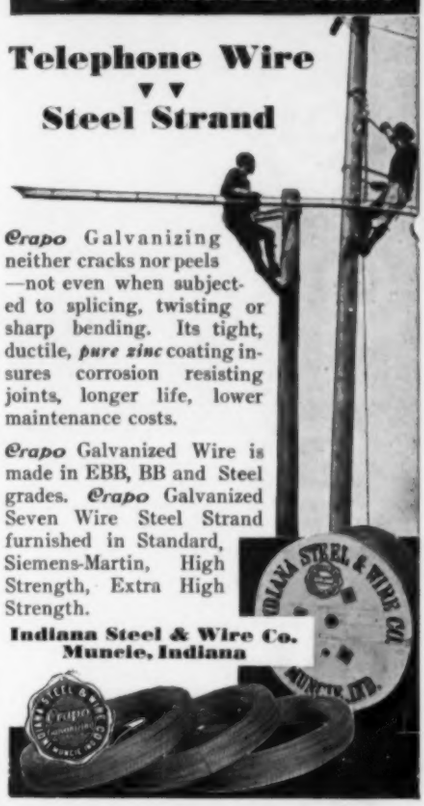
Steel Strand



Crapo Galvanizing neither cracks nor peels—not even when subjected to splicing, twisting or sharp bending. Its tight, ductile, *pure zinc* coating insures corrosion resisting joints, longer life, lower maintenance costs.

Crapo Galvanized Wire is made in EBB, BB and Steel grades. Crapo Galvanized Seven Wire Steel Strand furnished in Standard, Siemens-Martin, High Strength, Extra High Strength.

Indiana Steel & Wire Co.
Muncie, Indiana

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Cable Splicers' TOOLS

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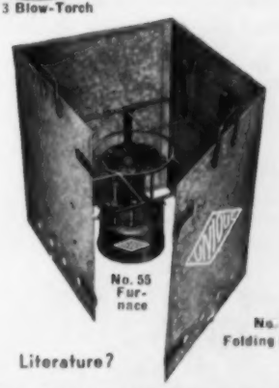
FURNACES
BLOW-TORCHES
FOLDING WIND SHIELDS
"SHORT GRIP" LADLES
FORMED WIPING CLOTHS
SOLDER COPPER HANDLES
TENT HEATERS
SOLDER POTS



No. 55 Furnace

No. 50 Folding Shield

Literature?

UNIQUE MANUFACTURING CO., INC.
221 W. Walton St., Chicago, Ill.

ALBERT C. STANNARD, St. Louis
Newly elected President of the Southwestern Bell Telephone Company

S-W Bell Elects Albert C. Stannard

● An election of officers in the Southwestern Bell Telephone Co. March 13 elevated Albert C. Stannard, St. Louis, to the presidency to succeed Albert B. Elias, who was elected chairman of the board.

Mr. Stannard, who has been first vice-president, has been associated with the Bell system for 48 years, starting with the American Telephone and Telegraph Co. in Springfield, Mass., in 1899. He has been in the Southwestern since 1921.

All directors of the company were re-elected at the annual meeting. Mr. Elias was elected chairman and William L. Holley St. Louis, general traffic manager, was named a vice-president. William A. Hughes, also of St. Louis, was appointed general traffic manager.

A. B. ELIAS, St. Louis
Elevated to Chairman of the Board
Southwestern Bell Telephone Company

Dillon Presents New Temperometer

Announcing a new all-purpose temperometer the Dillon Manufacturing Company has perfected a newly designed instrument. With all objectionable features eliminated and many new features added the company has announced that instruments are ready for immediate delivery.

Extremely modern in appearance with a blue steel ¾ in. tube and nickel plated head with total length 9 inches. Combination handle and clip eliminates burns and facilitates attaching the temperometer to the heating vessel where it can be left with no danger while immersed.

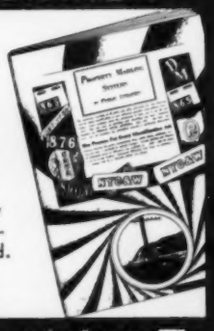
Sturdy and fool proof the new model has an open bottom for complete drain-

(Please turn to page 38)

PROPERTY MARKING FOR IDENTIFICATION

HOW UTILITIES CUT THEIR COSTS

This is one of the many valuable explanations made in this free book by an eminent authority on "Property Marking for Public Utilities," which will be sent to any official on request. Systems explained. Proper methods discussed. Send for your copy today.



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THE ELECTRIC STORAGE BATTERY CO., *Philadelphia*
World's largest manufacturers of storage batteries for every purpose.

TELERING
Only ONE Contact!
Price $44.00
F.O.B. factory
For better and cheaper ringing.
No Radio Interference
30-day free trial
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(See our space in next month's issue)

Live luxuriously at the
Commonwealth hotel

Cheerful
Convenient
Comfortable

Just 10 Minutes to the Loop
SPECIAL RATES FOR ALL TRADE SHOWS AND CONVENTIONS
The COMMONWEALTH is one of Chicago's newer hotels, convenient to every business, social, and sporting activity.
Newly furnished and tastefully decorated rooms are available at exceptionally reasonable rates.
Facing Lincoln Park and Lake Michigan
250 room 250 baths
All outside rooms—Rates starting at $2.00 single $3.00 double
Special weekly rates.
Finest transportation to all parts of the city.
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R. B. LORENZ ..... MANAGER
PINE GROVE AT DIVERSEY PARKWAY . . .
CHICAGO

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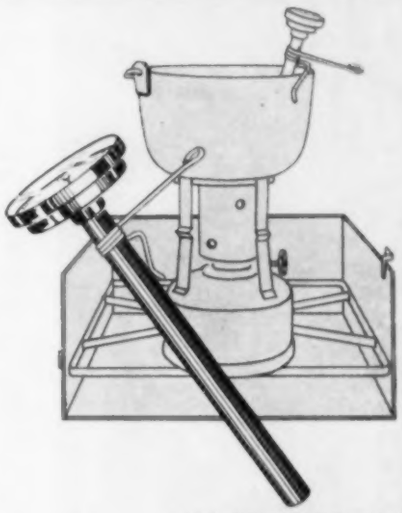
Here Is What You've Been Waiting For

A testing instrument embracing utility, stability, beauty and accuracy, for all purposes



Due to the scientific value of the DILLON TEMPEROMETER in determining temperatures, thereby increasing cablemen's efficiency in turning out dependable work, they are being placed in their kits as standard equipment, by the larger operating companies.

Price $6.00 F.O.B. Chicago.

Order through your Jobber, or direct to,

REGISTERS CORRECT TEMPERATURES OF—
- ★ Paraffine
- ★ Compounds
- ★ Wiping Solder
- ★ Impregnation Wax
- ★ Cable Damming Waxes.

DILLON MANUFACTURING COMPANY

63 East Lake Street — **Chicago, Illinois**

WHAT BETTER RECOMMENDATION
Than the Satisfaction of Hundreds of Users?
We Guarantee It

SUB-CYCLE

The MODERN Ringing Converter
NO MOVING PARTS!

- No Vibrating Contacts
- No Adjustments
- No Radio Interference
- Reverting Tone Feature

POWERFUL
ECONOMICAL

Output 20 Watts, 90 Volts
Operates on 110 volts A.C.

PRICE, $45.00
Order One Today
1 MONTH FREE TRIAL
At Our Risk

PERFECT SERVICE

LORAIN PRODUCTS CORPORATION, Lorain, Ohio

Lorain Products Corporation is exclusive manufacturer for use and sale in United States. Address foreign inquiries to Automatic Electric Sales Co., Ltd., Chicago, Ill.
Sold By Leading Distributors

NATIONAL CABLE RINGS are EASY TO HANDLE

—Quickly and Easily Placed on the Strand
—and Once On Will Not Jump Off—

Starting with the simple, convenient Handy Five Clusters, in which National Cable Rings reach you, until the cable hanging job is completed you'll find them big time savers. In the first place the simple Handy Five Cluster prevents hooking together and eliminates ground litter; then Nationals are easily placed, they will not pull or jump off, doing away with "reriding" and with their use you can pull the cable either way—no waiting. Standardize on "Nationals" and save.

THE NATIONAL TELEPHONE SUPPLY CO.
5100 SUPERIOR AVE. — CLEVELAND, OHIO
Canadian Mfg.—N. Slater Co., Lts.
Hamilton, Ont.
Export Distributor—Internation Standard Electric Corp., New York, N. Y.

All over the world

COOK PROTECTION AND TERMINAL EQUIPMENT IS ON THE JOB

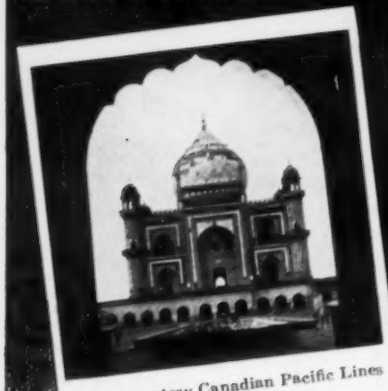


Photo courtesy Canadian Pacific Lines

In INDIA

COOK

—and in many other far corners of the world, high standards of telephone service are maintained with Cook equipment.

OUTDOOR PROTECTED COIL MOUNTING

A convenient single or double coil mounting on the standard Cook terminal base with fuses and True Gap dischargers.

COOK ELECTRIC CO.

2700 Southport Ave. Chicago

Always Specify COOK PROTECTION

age. Calibrated up to 1000 degrees F. all types of materials including waxes and paraffins which take low temperature and also wiping solders which register in the high temperatures, can be accurately tested for correct heat and use.

* With Dillon Temperometers in use throughout the World in many foreign countries, Mr. Dillon advises **Telephone Engineer** he gives full credit to the magazine through which he has advertised exclusively, for the remarkable result of the Temperometer's distribution.

A Delightful VACATION

BLUE BONNET HOTEL

in San Antonio

TEXAS

Spend your vacation in San Antonio, gateway to Old Mexico — where lawns and shrubbery are green all the year — where Golf, Horseback Riding Hunting and Fishing are at their best twelve months out of the year

GATEWAY TO OLD MEXICO

SAN ANTONIO

CARL J. HAMMONS
Managing Director
ROLAND BURGE
Resident Manager

250 ROOMS with Bath from $2

MEXICO

ALSO OPERATING — GOODHUE, PORT ARTHUR — EL JARDIN, BROWNSVILLE

CHICAGO'S NEWEST HOTEL

OFFERS
Free Radio Loud Speaker
Circulating Ice Water
Tub Bath or Shower in every room
Garage . . . with direct entrance to hotel

RATES
From $2.00 Single
$3.00 Double

400 ROOMS FIREPROOF

HARRISON HOTEL

HARRISON STREET
(Just off Michigan Blvd.)
ANDREW C. WEISBURG, President
EDWARD W. JACKS, Manager

Illustrated booklet sent upon request

Statement Filed By United Companies

Another chapter was written in the complicated collapse of the C. L. Brown properties on March 30 in Abilene, Kan., by the filing in federal court of the first report of the trustee in bankruptcy, C. A. Henry.

His statement shows that the United Telephone and Electric company, the parent holding company, had 45 subsidiary companies. These have been reduced during the past year to 26.

The United Stores in bankruptcy were sold to W. O. Anderson of Topeka, the Ellis County Gas company was merged with the Central Kansas Power Co., the Sunflower Hotel Co. was turned over to the Abilene Hotel company and 11 telephone companies in Pennsylvania were merged in one.

The assets of the parent company were $22,781,750. The expenses have been reduced $3,500 a week by elimination of expensive employes; the profits last year were $659,242.

The parent company has claims against the C. L. Brown estate of $406,768 and against the Brown Memorial Foundation, which includes the park and home for the aged south of the city, of $94,441. All these are in court and some claims are likely to be compromised.

The trustee says that 3,564 new telephone subscribers have been added, that earnings increased during the year $310,184 and $651,122 was available for dividends, an increase of $207,144.

When the various claims and debts are settled, the latter including $108,301 income taxes, $650,000 to the Southwestern Bell Telephone Co., $232,957 to the Indiana Bell Telephone Co., $65,700 to the United Trust company and $358,994 to various subsidiaries, a reorganization will take place.

Bell Continues Station Increase

The Bell Telephone system added 105,000 telephones in March, compared with an increase of 76,300 in the same month a year ago, the American Telephone & Telegraph Company reported in April.

The first quarter net gain for the system was 292,800 telephones compared with 188,700 for the same quarter last year. New business in certain of the company's divisions is continuing to run better than at any time since 1929 and in other areas is ahead of that year.

New York Telephone Company reported a net gain of 13,961 telephones in service during March, compared with a gain of 9,406 in March, 1936. For the first quarter there was an increase of 39,172 telephones, against an increase of 22,054 last year.

Bell Telephone Company of Pennsylvania reported a net gain of 9,032 telephones in service for March, making a net gain of 28,262 for the first quarter. January gain was 8,948 and February gain was 10,282.

For March, 1936, the net gain was 4,751 and for the first quarter of 1936, the net gain was 13,173.

Cincinnati & Suburban Bell Telephone Company operated 169,165 stations on March 31, a gain of 3,245 during the month and gain of 9,983 over March 31, 1936. Part of the gain was due to reinstallations of phones disconnected during the January-February flood.

Firm Changes Name

The Telephone Repair Shop, owned and operated by Daniel H. McNulty, of 1760 Lunt Avenue, Chicago, has changed the name to the Telephone Repair Company, and the business is being enlarged, according to Mr. McNulty. Business has been very brisk during the past year and it has been found necessary to increase the capacity in order to keep abreast of the times, he states.

Read the ads in this issue. You will save money if you do.

Two Way Mastergrip

- Mastergrip is **more economical** because at no greater initial cost, it is less expensive to install.
- Mastergrip **is easy to install** because it is light, compact, self-expanding; requires small or no hole and no expensive tools.
- Mastergrip has **power to hold** because it is expanded into undisturbed soil and is made of **Certified Malleable Iron** or its superior.
- Mastergrip is **light in weight**, which makes every operation easier.
- Mastergrip is dependable in swampy and sandy soils where it is difficult to dig a hole because Mastergrip can be **driven into place** to any depth.
- Mastergrip **blades operate independently** allowing anchorage against buildings or walls or in rocky soil.

Descriptive Folder on Request

THE AIKEN
MASTERGRIP
ANCHOR CO., INC.

63 E. Lake St. Chicago
114 N. 7th St. Saint Louis

Laboratory Tested

Telephone Wire

RUBBER COVERED
COPPERWELD - BRONZE - COPPER
DROP - INSIDE and BRIDLE

WB

MANUFACTURED BY
The Whitney Blake Co.

SOLE SELLING AGENTS IN U. S. A.

Graybar
ELECTRIC COMPANY

FOREIGN DISTRIBUTORS: *International Standard Electric Corporation*, 67 Broad St., N. Y. C.

The Clearing House

For the convenience of readers of Telephone Engineer

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HERDRICH AND BOGGS
Certified Public Accountants
Specializing in Telephone Accounting and Rate Cases Since 1918.
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Indianapolis, Indiana

Your Bookkeeper

Should be one who has had the practical experience of Operating, Owning and Managing Telephone Plants. He should be a specialist in Telephone Accounting. He should be able to make up the books in his office from data supplied by you, and at a nominal cost.

He should supply the necessary reporting Forms without charge, and be ready to assist you with your various annual Government or State reports. Twenty-five years of this kind of experience is offered to you.

Francis A. Bowdle
Registered Public Accountant
BOX 642, WHEATON, ILL.

ACCOUNTING, TAX & RATE CONSULTANT

22 years continuous contact with telephone organizations.

C. B. RUSSELL
Interurban Building
COLUMBUS, OHIO

Repeaters

A NEW TELEPHONE REPEATER

Harding Universal Telephone Repeater Self-adjusting to changing lines. Cord-circuit, Terminal and Line adaptations. No external balancing equipment. By-pass and Intermediate Ringer. Selective or Dial Switching control. Working at 15 DB in dispatching circuits; 20 DB in toll circuits.

HARDING TELEPHONE REPEATERS
2138 N. New Jersey St., Indpls., Ind.

WANTED

Plant superintendent with general experience with Kellogg switchboards, cable plants, construction work and general outside plant to take care of nine Florida exchanges, two common battery and seven magneto with approximately 4000 stations. Please communicate with W. E. Glisson, General Manager, Southeastern Telephone Company, Tallahassee, Florida.

Paging System Developed

Newest development of the Stromberg-Carlson Telephone Manufacturing Company is a complete, inexpensive paging system put up in one package, and ready for immediate installation. No engineering experience is required as complete instructions are packed with the system. Only tools required are a screwdriver and a pair of pliers. It consists of a telephone type microphone, amplifier, two permanent magnet type dynamic speakers and 200 feet of wire. It may be expanded to operate twelve speakers if desired.

The microphone used in the system is equipped with a push-button in its base to throw the microphone into service. The unusually high output of this Stromberg-Carlson microphone permits the use of a low gain amplifier thereby reducing hum and tube noises in the loud-speaker. It gives ample volume and is exceptionally quiet between pagings. It requires no current adjustment.

The amplifier used is a compact unit only 6½ by 13½ by 7½ inches over all and is designed to give the utmost in voice paging service at a moderate cost. It is made of copper clad steel in a handsome, brown crackle finish with all terminals placed on the front for ready accessibility. The amplifier on-off switch is separate from the volume control so that the volume knob may be set and left in its proper position. It uses four standard type tubes, obtainable anywhere, and has an output of 10 watts.

The speakers used are a highly efficient, permanent magnet type designed for wall mounting and attractively finished in walnut. Height is 9½ in., Width 8 in. and Depth 4 1/6 in. In situations where a directional type of speaker is needed the Stromberg-Carlson No. 32 Paging Projector Speaker may be added to the system. Overall dimensions are 20⅝ by 20⅝ by 29⅛ inches. It is finished in battle-ship grey.

In locations where alternating current is not available an Electronic Converter may be obtained which converts 110 volts DC to 110 volts, 60 cycle AC.

The uses to which such a system may be put are almost too numerous to mention. It may be used to locate or summon individuals in all places of business or pleasure such as offices, factories, laboratories, shops, stores, clubs, hotels etc.; to announce sales or special service in hotels and stores; to broadcast arrivals

Poles

Carney

CEDAR POLES
Plain or Butt Treated
B. J. CARNEY & CO.
100 No. 7th St. Minneapolis

Finished Cedar Poles
VALENTINE CLARK CORPORATION
St. Paul, Minn.

Telephone Directories

Telephone Directory ADVERTISING
Write or telephone for proposition
L.M.BERRY & CO.
Call L.D.16 - Telephone Bldg., Dayton, O.

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J. G. WRAY & CO.
Telephone Engineers
Specialists in Appraisals, Rate Surveys, Financial Investigations, Organization and Operation of Telephone Companies
105 West Adams Street
CHICAGO

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CONSULTING ENGINEER
Telephone Engineering — Construction Supervision — Appraisals — Financial — Rate Investigations
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ACCOUNTANTS AND ENGINEERS
Specializing in a Professional Service to Telephone Utilities Covering the Field of Accounting and Engineering
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SYRACUSE, NEW YORK

The Clearing House

For the convenience of readers of Telephone Engineer

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Rebuilding and Repairing

TRANSMITTERS

Absolutely finest workmanship guaranteed

Baked, black, velvet finish, New granular carbon. Workmanship, adjustments and tests made with the latest and most improved apparatus. 50c each less backs. One year money back guarantee.

Full information on request

SPECIALS FOR APRIL

SWITCHBOARDS

MAGNETO

REBUILT IN A-1 SHAPE

W.E. wall switchboard, 15 line, 3 pairs of cords	$ 75.00
Kellogg, 50 line, 8 pairs of cords, NEW OAK CABINET	200.00
Kellogg 165 line, 15 pairs of cords	350.00
W.E. 90 line, 10 pairs of cords	300.00
W.E. 105 line, 15 pairs of cords	350.00
W.E. heat coil protectors, per bank of 20	10.00
W.E. heat coils, each	10c
W.E. No. 1317 wallphones 5-bar 1600	12.00

Telephone Repair Co.

1760 LUNT AVE., CHICAGO, ILLINOIS

DANIEL H. McNULTY, Owner & Manager

RECONSTRUCTED EQUIPMENT

Kellogg No. 301 E 500 ohm line drops and jacks 10 per strip @	$16.00
Kellogg No. 3A 100 ohm line drops and jacks per strip of 5 @	6.25
Western Elec. No. 22C Shutter type line drops and jacks 5 per strip @	8.75
Western Elec. No. 2C Ball type 80 ohm line drops and jacks 5 per strip @	6.00
Kellogg No. 2696 4-bar 1000-1600 or 2500 ohm Bdg. compact type wall sets	8.00
Western Elec. No. 317 5-bar 1000-1600 or 2500 ohm Bdg. compact wall sets with 47 Gen. and external post line connections @	8.50
Kellogg No. 84 desk set with Kellogg Trans. & Rec. complete with New cabinet 3-bar 1000-1600 or 2500 ohm ringer inside connection signal set $9.50—4-bar $10.00—5-bar @	11.25
Western Elec. No. 20 desk set with W. E. Trans. & Rec. Complete with New cabinet No. 315 3-bar 1000-1600 or 2500 ohm ringer inside connection signal set @ $9.75—4-bar $10.50—5-bar	11.50
Kellogg New Grabaphones with New cabinet inside connection 3-bar 1000-1600 or 2500 ohm signal set @ $12.25—4-bar $12.75—5-bar @	14.00
Kellogg Grabaphone No. 115 Stand & No. 11 Grabaphone complete less signal set @	7.25
Western Elec. No. 21 W 1 M. F. Condensers @	.35
Monarch desk set complete with 3-bar 1000-1600 or 2500 ohm ringer inside connection signal set @	7.85

REBUILT ELECTRIC EQUIPMENT CO.

Not Inc.

1940 W. 21st St., Pilsen Sta.

Chicago, Ill.

and departures in airports, depots and at docks; to transmit orders and instructions in garages, restaurants, shipping rooms, stock rooms and warehouses; to broadcast safety and health talks in all industries, while employees remain at stations, etc. Many operating companies are finding a source of increased revenue through rental of these systems.

Operation is so simple that any employee can use it.

A circular describing and explaining the No. 115 Paging System has been prepared by the Stromberg-Carlson Telephone Manufacturing Company and may be had by writing the factory at Rochester, N. Y.

Folds Family Visiting Texas

Mr. George R. Folds, president of Cook Electric Co., Chicago, accompanied by Mrs. Folds, a grown daughter and their youngest son are visiting in San Antonio, Texas. The family will remain there while Mr. Folds makes a business trip to the West coast. Typical Spring weather comparable to a Chicago June day greeted them on their arrival, Mr. Folds writes.

New Service For Aliens

● When you dial information on the telephone, the voice which responds, providing it is not busy, invariably speaks but one language.

The latest development of the telephone is a linguistic central station which answers questions automatically in a score of different languages without a moment's hesitation. The replies are made to set questions as to the time of day, and other formal inquiries, by means of a series of phonograph records operated automatically. An Englishman, French, Italian or even Chinaman for that matter turns the dial to the proper number, and his question is answered in his native tongue.

The new telephone is used for advertising purposes and will give a lucid explanation of a particular product in a dozen different languages. Demonstrations of the new polyglot telephone were made at the Leipzig Fair where visitors from 72 countries assembled, rivalling the Tower of Babel.

RECONDITIONED

LATE TYPE

RELAYS

Line and Cut-off

Trunk Plates

Cord Circuit Relays

Kellogg—Stromberg-Carlson

Save 40 to 50%

Buckeye Telephone & Supply Company

COLUMBUS, OHIO

BARTLETT

Tree Trimming Equipment

Illustrated are three of the Bartlett Tools for tree trimming. Special attention is called to the Bartlett No. 1-W Tree Trimmer with the compound lever. Has enormous cutting power; blades are crucible steel. It is a side cutting tool with a hardened hook. Available in any length from 6 to 16 ft. — in one piece or sectional poles.

BARTLETT MFG. CO.

3051 E. Grand Blvd. Detroit, Mich.

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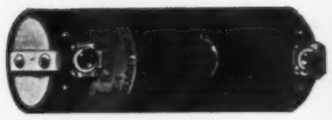
Entirely NEW in Telephony!



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RARE GAS RELAY

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Low Cost. Installed with a Single Screw.
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Newark, N. J. BRACH Est. 1906

Makers of
Rare Gas Lightning Arresters
Test-O-Lite, Etc., for 30 Years

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WODACK "DO-ALL"
This is the electric hammer that can be changed to a drill for metal and wood. Two sizes. Ask for prices.

Wodack Elec. Tool Corp. 4637 W. Huron St. CHICAGO, ILL.

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TRUE POSTURE
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A true posture chair designed to increase efficiency, mental alertness, reduce fatigue, improve the health and comfort of the operator.
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Available in 3 Different Heights.
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